

EASTERN KENTUCKY UNIVERSITY

Department of Physics and Astronomy

**Analysis, Review, and Documentation
of the Activation Data from LDEF Material**

July, 1992

Final Technical Report

Contract # H-08071D

(Principal Investigator: Dr. C. E. Laird)

**Prepared for the
George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812**

Eastern Kentucky University

Richmond, Kentucky 40475

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AND DOCUMENTATION OF THE ACTIVATION
DATA FROM LDEF MATERIAL Final
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by

Dr. C. E. Laird
Professor of Physics
Eastern Kentucky University

Samples removed from LDEF-1 are being studied at various laboratories to determine the specific activity(pCi/kg) produced in orbit by exposure to protons and neutrons in near-Earth orbit. These activities are being corrected for efficiency, self-attenuation, and background. The activities and associated gamma-ray spectra are being collected, analyzed, documented and reviewed by faculty and graduate students at Eastern Kentucky University. The currently available activation results have been tabulated and reviewed in this report. Approximately 500 spectra have been accumulated for future archival and analysis. The effect of the changing satellite orbit on the activation is reported herein and was calculated using more recent estimates of the flux of Van Allen belt protons.

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Final Technical Report

NASA Contract H-08071D

INTRODUCTION

Since retrieval in January, 1990, almost 400 samples from the LDEF-1 spacecraft have been studied to ascertain the activation induced by exposure to the radiation environment of space. These samples have been studied with low-background gamma-ray spectrometers at Marshall Space Flight Center (MSFC) and at seven other counting laboratories to carefully measure specific activities(activity per unit mass). Eastern Kentucky University (EKU) has been active in providing analytical support to these laboratories and in the interpretation of the resulting activities. National Aeronautics and Space Administration(NASA) Contract #H-08071D provided funding for the EKU participation as a continuation and expansion of the studies previously supported by contracts NAS8-35180 and NAS8-36642. Specifically, NASA contract #H-08071D required the following statement of work:

The contractor shall perform the following studies and provide calculations related to the induced radioactivity of metal samples returned from the LDEF-1 mission.

1. Using gamma-ray spectra obtained post-flight from LDEF samples at the counting laboratories, derive net activities due to radioisotopes detected in the samples. Corrections for geometry, self-absorption, detector efficiency and background shall be made. Uncertainties of the net rate due to counting statistics and experimental errors shall be estimated. Quarterly progress reports and a copy of the final report will be required to be delivered to the addresses indicated in Attachment J-2 of the Purchase Order.

2. The saturation activity, averaged over the mission, shall be determined for each radioisotope, measured in disintegrations per second per kilogram of material for selected samples.

3. Using experimentally-determined activation cross sections estimates shall be made of the fluxes of activating protons and neutrons, averaged over the mission lifetime at various locations within the LDEF spacecraft.

In fulfillment of this statement of work, this report includes:

1. a tabulation of the specific activities measured from samples sent to Lawrence Berkeley Laboratory(LBL), Los Alamos National Laboratory(LANL), Lawrence Livermore Laboratory(LLL), Savannah River Laboratory(SRL), the Tennessee Valley Authority Western Area Radiological Laboratory(TVA), and Battelle Memorial Institute Pacific Northwest Laboratory(PNWL). These activities have been corrected for geometry, efficiency, self absorption and background. They are decay corrected to the designated retrieval date of January 20, 1990. The associated errors are given. The principal investigator is uncertain as to whether or not the specific activities from TVA include the attenuation corrections. Specific activities and spectra have not been received for samples studied at Johnson Space Center(JSC). Spectra have not been received from TVA, LBL, PNWL, and LANL. Also, the results from PNWL are not complete.

2. an initial tabulation of the specific activities resulting from the analysis of gamma-ray spectra taken at MSFC. These results are corrected for geometry, efficiency, self absorption and background and are decay corrected to 1/20/90. This tabulation has been sent to Alan Harmon at MSFC for his evaluation and response.

3. the expected activation for the LDEF samples calculated using the proton fluxes supplied by John Watt of MSFC for an orbit with a 28.5° inclination at an altitude of 172 nautical miles during a period of maximum solar activity. This, coupled with previous calculation^{1,2}, gives an estimated range of saturation activities for the LDEF samples. However, a better estimation of the activation requires a more careful calculation using proton fluxes appropriate to the rapidly decaying orbit of LDEF and the change over the mission from a period of minimum to one of maximum solar activity.

4. the expected activation at 172 nautical miles (nmi) calculated using new estimates of the proton and neutron fluxes

encountered by LDEF. However, more accurate flux estimates require activation calculations taking into account the changing orbital altitude and the changing solar activity as mentioned in (3) above.

The results presented in this report are limited by the incomplete nature of the reports of sample activities measured at the counting laboratories. As of June 21, 1992, extensive reports of specific activities have been received only from LLNL, SRL, LANL, and LBL. Analysis of the MSFC data is nearing completion, but we(EKU) have received neither specific activities nor gamma-ray spectra from PNWL, JSC, or TVA. Except for the MSFC specific activities, the compiled results will be discussed in the following sections.

As was the case with the report on NASA Contract # NAS8-36649, a peripheral result of this study has been the interaction with university students and with a neighboring institution. Over the past year four graduate students and two undergraduates have participated in this project. Also, the principal investigator gave a presentation at Western Kentucky University describing the LDEF-1 induced-activation study.

I. TABULATED SPECIFIC ACTIVITIES

The scientific investigator and the associated laboratory participating in the sample counting are listed in Table 1. The tabulated specific activities with associated error from those laboratories that have submitted them to EKU are listed in Table 2. Results from MSFC are not included because the final results from the EKU analysis of the spectra have to be reviewed by Dr. Alan Harmon. Some of these analytical results have been reported elsewhere(ref. 3-5).

Figures 1-10 gives graphical representations of this data for comparison. Figure 1 shows a composite of the specific activations with associated errors for the LH trunnion as a function of depth along the axis of the trunnion. The legend identifies the scientific investigator for the data points. Because the data is not currently available, direct comparisons for a specific section are not given. However, indications of the expected trend of decreasing activation down the length of the trunnion are evident. Considerable

nonstatistical fluctuations from this trend are seen not only among the data from different laboratories but also from within one data set(Camp/McLean). These variations should be given further study in consultation with the scientific investigators.

Figure 2 shows the consistency of the activation for several layers of the LHD trunnion section(earth end) independently measured by Moss and Reedy at LANL. Figure 3 shows that the activation on the two sides of a trunnion section are different as would be expected if there was a larger flux of incident particles on one side than on the other, or a diminution of the flux by passage through the section. Figure 4 shows the decreasing activation of a trunnion layer as a function of the radial distance into the RHG section, and also indicates that there is a greater incident flux on the earth(ER) side than on the space(SP). Figure 5 gives the same activation as a function of depth as in figure 4 for the south(S) and earth(E) except for the RHD section. Figure 6 is similar to fig. 3 except for the space end(SP) of RHG.

Figures 7-10 show the specific activities reported reported by Moss and Reedy at LANL. These two investigators performed essentially independent gamma-ray counting although there was some consultation concerning consistency of the results. Their final results are very consistent although the stated errors are quite large; especially for the first layer studied, layer 2. This data shows that the activation for the space end of both RHD and LHD is consistently smaller than for the earth end. Weighed averaging of these results would significantly reduce the associated error.

II. PROTON FLUX VARIATION AND PREDICTED ACTIVATION

During the sixty-eight months that LDEF-1 was in orbit, significant changes occurred in the flux of protons encountered in the region of the Van Allen Belt known as the South Atlantic Anomaly. These changes were caused by two factors. First, the original 258 nm orbit decreased at an accelerating rate reaching an altitude of 172 nm at retrieval. Second, around day 1400 in the mission a period of minimum solar activity ended and a period of maximum activity began. The subsequent swelling of the atmosphere of the earth caused a greater resistance to the motion of LDEF-1 and a greater

atmospheric interaction with Van Allen Belt protons. The net results of these processes was a decrease in proton flux encountered by the spacecraft. Figure 10 shows the flux of 50 MeV protons as a function of time in orbit taking into account the solar effects listed above⁶. Figure 11 shows the associated production of ⁵⁴Mn. Clearly evident in these plots are the significant changes in the production rate of spacecraft material.

The effect of this dropping production rate on the final specific activity of LDEF-1 materials is very profound. If the fluxes had been constant, then many isotopes with half-lives of less than about one or two years would have neared saturation by the time of retrieval. This saturated activity would have been closely associated with the flux (the number and energy) of activating particles. However, the final specific activities are strongly dependent on the rate of flux decrease with time at all energies. Predicting the expected activation, or determining the flux of activating particles, for LDEF-1 will require a detailed calculation which includes the accumulated daily activation and the decay of the calculated activity from each day until the day of retrieval.

Table 3 gives a summary of the expected activation on the day of retrieval. The fluxes are those supplied by Watts⁶ for the 172 nm orbit of LDEF-1 in January, 1990. The cross sections for nuclear reactions are the same as in refs. 1 and 2.

REFERENCES

1. C. E. Laird, Study of Proton and Neutron Activation of Metal Samples in Low-Earth Orbit, July, 1985, Final Technical Report, NASA Contract NAS8-35180.
2. C. E. Laird, Study of Activation of Metal Samples from LDEF-1 and Spacelab-2, July, 1991, Final Technical Report, NASA Contract NAS8-36649.
3. Harmon, B. A., Fishman, G. J., Parnell, T. A., and Laird, C. E. : Induced Radioactivity in LDEF Components, p. 301-311, part 1, First Post-Retrieval Symposium(1991).
4. W. G. Winn, Gamma-Ray Spectroscopy of LDEF Samples, USDOE SRS Report WSRC-RD-91-16 (February 19,1992). (See also, Gamma-Ray Spectroscopy of LDEF Samples at SRL, p. 287-300, part 1, First Post-Retrieval Symposium(1991).)
5. C. E. Moss, and R. C. Reedy, Measurements of Induced Radioactivity in some LDEF Samples, p. 271-285, part 1, First Post-Retrieval Symposium(1991) .
6. J. W. Watts, Jr., Predictions of LDEF Fluxes and Dose Due to Geometrically Trapped Protons and Electrons, Nucl. Tracks Radiat. Meas. **20**, 85(1990).

**Table 1. Counting Facilities
and Associated Scientists**

Dr. Gerald Fishman

Dr. B. Alan Harmon

NASA/Marshall Space Flight Center(NASA/MSFC)

Dr. Ronald L. Brodzinski

Dr. James Reeves

Pacific Northwest Laboratory(PNWL)

Batelle Memorial Institute

Dr. Alan R. Smith

Donna L. Hurley

Lawrence Berkeley Laboratory(LBL)

Dr. Calvin E. Moss

Dr. Robert C. Reedy

Los Alamos National Laboratory(LANL)

Dr. David C. Camp

Lawrence Livermore National Laboratory(LLNL)

Mr. Charles Frederick

Tennessee Valley Authority(TVA)

Western Area Radiological Laboratory

Dr. David J. Lindstrom

NASA/Johnson Space Center(JSC)

Dr. Bill Winn

Westinghouse Corporation

Savannah River Laboratory(SRL)

Table 2. Specific Activities for LDEF Samples as Reported by the Counting Laboratories.

Pages	Laboratory
LLL 1- 11	Lawrence Livermore Laboratory
LANL 1- 10	Los Alamos National Laboratory
TVA 1- 10	TVA Western Area Laboratory
SRL 1- 14	Savannah River Laboratory
PNWL 1- 4	Pacific Northwest Laboratory
LBL 1- 5	Lawrence Berkeley Laboratory

TABLE OF NUCLIDES MEASUREMENTS

DATE: JAN. 90

TITLE: LDEF

FILE FROM: CAMP/McLEAN (MAR. 90)

SAMPLES(No.)	B8-916-D1 (271L01)	B8-916-D2 (274W01)	B8-916-D3 (274L01)	B8-920-D1 (271W01)	B8-920-D2 (277W01)	B8-920-D3 (277L01)
--------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

NUC(PCi/kg)

NA-22	82.38(10.7%)			85.83(5.4%)		
AU-X	105.8(39.9%)					
RA-226	317.1(4.6%)					
TH-228	22.16(69.2%)					
U-235	21.25(69.4%)			45.33(19.5%)		
PB-X		1288(21.2%)	597.5(54.2%)		1394(21.2%)	1006(20.9%)
BI-207			4.562(21.5%)			4.980(20.7%)
CE-141						
EU-450						
LU-173						
W-188						
U-X						
U-238						
EU-152						
EU-154						
SC-46						

TI-920-FG1 (281L01)	TI-916-AG2 (281W01)	B8-920-D2 (277W01)	B8-920-D3 (277L01)	TI-920-FG1 (281L01)	TI-916-AG2 (281W01)
------------------------	------------------------	-----------------------	-----------------------	------------------------	------------------------

NA-22					
AU-X		61.84(44.2%)			61.84(44.2%)
RA-226	44.54(19.2%)	12.66(49.1%)		44.54(19.2%)	12.66(49.1%)
TH-228		52.31(43.8%)			52.31(43.8%)
U-235	328.9(3.7%)	383.6(4.0%)		328.9(3.7%)	383.6(4.0%)
PB-X			1394(21.2%)	1006(20.9%)	
BI-207				4.980(20.7%)	
CE-141	113.8(28.5%)	150.0(28.1%)			113.8(28.5%)
EU-450	4.025(55.1%)			4.025(55.1%)	
LU-173	181.2(13.4%)	431.7(4.3%)		181.2(13.4%)	431.7(4.3%)
W-188	1845(15.1%)	2694(12.7%)		1845(15.1%)	2694(12.7%)
U-X	74.11(21.4%)	86.70(37.7%)		74.11(21.4%)	86.70(37.7%)
U-238	6478(10.3%)	5881(8.3%)		6478(10.3%)	5881(8.3%)
EU-152		7.805(61.4%)			7.805(61.4%)
EU-154		8.966(42.4%)			8.966(42.4%)
SC-46		32.84(57.0%)	*		32.84(57.0%)

TABLE OF NUCLIDES MEASUREMENTS

DATE: JAN.90

TITLE: LDEF

(MAR.90)

SAMPLES(NO.) NUC(PCI/kg)	BOLTS-58 (082W01)	BOLTS-30-D (158W01)	FILE FROM: CAMP/MCLEAN BOLTS-11-H* (085W03)	FILE FROM: CAMP/MCLEAN BOLTS-H-35 (165W01)
BE-7	12.07(8.0%)	933.7(23.8%)	436.6(29.9%)	
NA-22	3517(11.6%)	1736(16.6%)		1994(18.3%)
SC-46	2933(16.6%)		15.24(48.0%)	
MN-54	645.5(1.6%)	346.0(2.5%)	263.7(3.8%)	385.6(2.2%)
CO-56	9310(5.9%)	5367(17.8%)	40.15(22.1%)	5081(17.4%)
CO-57	221.8(4.7%)	180.4(4.3%)	279.2(6.3%)	188.3(5.6%)
CO-58	6642(10.3%)	3844(29.5%)	35.74(69.9%)	3449(34.0%)
TH-228	1728(32.5%)	2172(22.5%)		
RA-226		1848(28.6%)	44.67(23.8%)	
EU-154				1554(69.3%)

*DOUBLE SAME DATA FOR THE SAME SAMPLE

SAMPLES(NO.)

NUC(PCI/kg)	BOLTS-LEADNG (169W01)	BOLTS-TRAIL (172W01)	BOLTS-11-H (085W01)
BE-7	10.32(26.3%)		624.3(32.7%)
NA-22	757.6(29.6%)	1209(21.0%)	
SC-46			
MN-54	128.0(4.6%)	228.3(3.2%)	270.4(6.3%)
CO-56			44.46(35.2%)
CO-57	8119(7.2%)	137.2(4.8%)	272.2(10.3%)
CO-58	1779(54.6%)		
TH-228		1357(43.7%)	
RA-226			62.91(28.9%)
EU-154			

TABLE OF NUCLIDES MEASUREMENTS

DATE: JAN 90

SAMPLESNO.	NUCLIDES	FILE FROM: CAMP/MCLEAN	FILE FROM: CAMP/MCLEAN	(MAR.90)	CO-56 (PCi/kg)	CO-58 (PCi/kg)	CO-60 (PCi/kg)	XE-133 CR-51 (PCi/kg)	RA-226 (PCi/kg)
RHJ-T-TR/079W01*	4.363(21.3%)	95.33(2.8%)	3.849(27.2%)	27.34(22.8%)	5.352(64.6%)	1.453(38.8%)	61.84(44.2%)C		
RHJ-T-TR/075L02*	3.967(22.5%)	88.88(3.3%)	3.112(32.1%)	18.00(19.5%)	22.21(12.6%)	5.053(48.3%)	2.360(17.1%)	6.723(12.8%)X	
RHJ-T-TR/075L01*	5.756(18.4%)	89.45(3.4%)	3.058(33.5%)	24.90(15.3%)	3.266(27.8%)	1.329(33.4%)	52.31(43.8%)C		
RHJ-T-TR/075L03*	3.542(27.2%)	87.00(2.7%)	4.316(17.1%)	86.66(11.8%)	3.343(23.2%)	23.12(15.4%)	5.370(20.3%)	1.427(24.0%)	1.172(21.2%)X
RHJ-T-TR/079W02*	4.342(19.8%)	88.18(2.1%)	3.854(17.8%)	83.24(2.7%)	3.536(23.7%)	20.77(12.4%)	1.998(23.7%)	1.074(10.5%)X	
RHK-T-TR/079W03*	3.854(20.5%)	85.52(2.1%)	3.756(14.2%)	84.34(1.8%)	3.518(21.1%)	29.42(15.1%)	5.451(28.0%)	72.43(26.7%)X	2.717(65.6%)
RHK-T-TR/075W01*	4.354(20.5%)	83.24(2.7%)	5.692(24.6%)	84.89(4.2%)	3.389(17.6%)	28.56(13.0%)	5.043(21.7%)	1.504(26.5%)	
RHK-T-TR/075W02*	3.854(17.8%)	85.52(2.1%)	4.171(20.2%)	86.81(3.3%)	3.534(28.7%)	25.37(16.9%)	4.222(66.4%)	1.491(22.7%)	
RHK-T-TR/079L01*	5.692(24.6%)	84.89(4.2%)	4.814(16.6%)	94.38(2.1%)	4.160(20.0%)	22.65(13.7%)	2.089(25.2%)	1.324(11.0%)X	7.008(31.3%)
RHK-T-TR/079L02*	4.171(20.2%)	86.81(3.3%)	5.143(16.6%)	96.07(2.1%)	4.470(20.0%)	21.13(11.7%)	6.246(65.4%)	1.512(11.3%)X	4.535(48.1%)
LHJ-T-TR/068L03-1	4.814(16.6%)	94.38(2.1%)	5.035(16.7%)	96.05(2.1%)	4.774(18.6%)	21.57(11.7%)	6.751(65.4%)	2.687(17.7%)	5.822(22.2%)
LHJ-T-TR/068L03-2	5.143(16.6%)	96.07(2.1%)	6.433(21.2%)	95.88(3.5%)	4.565(35.1%)	21.57(11.7%)	6.694(17.7%)	2.694(17.7%)	5.822(22.2%)
LHJ-T-TR/072L02	5.035(16.7%)	96.05(2.1%)	6.433(21.2%)	95.88(3.5%)	4.565(35.1%)	25.55(22.6%)	7.720(62.9%)	2.429(17.2%)	9.245(14.0%)
LHJ-T-TR/068L01-1	6.433(21.2%)	95.88(3.5%)	5.840(23.5%)	95.87(2.5%)	4.690(29.2%)	19.69(22.7%)	7.204(60.5%)	1.910(32.8%)	10.06(22.8%)
LHJ-T-TR/068L02-1	5.840(23.5%)	95.94(3.4%)	5.163(28.8%)	95.94(3.4%)	5.163(28.8%)	19.69(22.7%)	5.201(53.7%)	2.959(24.3%)	6.901(29.1%)
LHJ-B-TR/071L01-1									13.08(15.6%)

SAMPLES/NO.	NUCLIDES	SC-46 (PCI/kg)	MN-54 (PCI/kg)	CO-56 (PCI/kg)	CO-57 (PCI/kg)	CO-60 (PCI/kg)	CR-51 (PCI/kg)	XE-133 (PCI/kg)	RA-226 (PCI/kg)
LHJ-B-TR/072L02-1	4.713(16.7%)	94.36(2.1%)	4.444(18.6%)	19.21(11.9%)	5.151(52.4%)	2.422(17.2%)		9.245(14.0%)	
LHJ-B-TR/072L01-1	4.779(20.6%)	96.10(2.4%)	4.337(24.2%)		2.723(18.7%)			10.66(13.8%)	
LHK-T-TR/068W03-1	4.670(10.9%)	93.00(1.8%)	3.516(22.7%)	28.61(14.4%)	5.291(15.2%)	1.038(37.9%)		54.68(38.7%)C	
LHK-T-TR/068W03-2	4.989(10.9%)	94.67(1.8%)	3.778(22.7%)	29.21(14.4%)	5.719(15.2%)	1.041(37.9%)			
LHK-B-TR/072W02-1	4.342(11.3%)	93.45(1.7%)	3.280(17.5%)	27.10(15.6%)	5.562(14.0%)	1.138(29.6%)			
LHK-B-TR/072W02-2	4.638(11.3%)	95.12(1.7%)	3.524(17.5%)		6.012(14.0%)	1.142(29.6%)			
LHK-T-TR/068W02-1	5.319(12.2%)	93.46(2.0%)	3.388(27.7%)		6.119(21.4%)			72.43(41.0%)C	
LHK-T-TR/068W01-1	5.139(17.8%)	93.62(2.6%)	3.346(29.9%)	28.98(26.7%)	5.876(27.5%)				
LHK-B-TR/071W01-1	4.152(23.4%)	94.95(2.7%)		34.50(18.3%)	6.042(23.8%)				
LHK-B-TR/072W01-1	4.370(14.6%)	94.45(2.0%)	4.019(23.0%)	27.97(18.3%)		1.085(33.9%)			
LHC-TR/261W01		118.4(1.9%)		32.17(15.3%)		1.343(32.4%)			
LHH-TR/261L01	4.081(66.2%)	96.70(2.4%)		19.98(20.8%)		3.098(51.2%)			
LHN-TR/264L01		90.52(2.9%)		19.23(26.8%)					
RHC-TR/267W01		95.08(2.0%)		26.40(25.8%)					
RHH-TR/267L01		91.32(2.6%)		21.64(21.2%)					
RHN-TR/264W01		77.54(2.5%)		29.67(19.4%)					
LHJ-B-TR/071L01-2	4.833(28.8%)	94.25(3.4%)		19.29(22.7%)	4.812(53.7%)	2.950(24.3%)		13.08(15.6%)	
LHJ-B-TR/072L01-2	4.473(20.6%)	94.40(2.4%)	4.037(24.2%)			2.716(18.7%)		10.66(13.8%)	
LHJ-B-TR/072L02-2	4.713(16.7%)	94.36(2.1%)	4.444(18.6%)	19.21(11.9%)	5.151(52.4%)	2.422(17.2%)	983.5(30.2%)XE	9.245(14.0%)	

SAMPLE/SNO.	NUCLES	SC-46 (PCi/kg)	MN-54 (PCi/kg)	CO-56 (PCi/kg)	CO-57 (PCi/kg)	CO-58 (PCi/kg)	CO-60 (PCi/kg)	XE-133 CR-51 (PCi/kg)	RA-226 (PCi/kg)
LHJ-T-TR/068L01-2	6.022(21.2%)	94.20(3.5%)	4.249(35.1%)	25.03(22.6%)	7.142(62.9%)				10.06(22.8%)
LHJ-T-TR/068L02-2	5.466(23.5%)	94.18(2.5%)	4.366(29.2%)		6.665(60.5%)	1.905(32.8%)			6.90(29.1%)
LHJ-T-TR/068L03	4.814(16.6%)	94.38(2.1%)	4.160(20.0%)	21.13(11.7%)	6.246(65.4%)	2.687(17.7%)			5.822(22.2%)
LHK-B-TR/072W02	4.342(11.3%)	93.45(11.7%)	3.280(17.5%)		5.562(14.0%)	1.138(29.6%)			
LHK-B-TR/072W01-2	4.091(14.6%)	92.79(2.0%)	3.741(23.0%)	27.40(18.3%)		1.082(33.9%)			
LHK-B-TR/071W01-2	3.886(23.4%)	93.28(2.7%)		33.80(18.3%)	5.590(23.8%)				
LHK-T-TR/068W03	4.670(10.9%)	93.00(1.8%)	3.516(22.7%)	28.61(14.4%)	5.29(15.2%)	1.038(37.9%)			54.68(38.7%)C
LHK-T-TR/068W01-2	4.810(17.8%)	91.97(2.6%)	3.114(29.9%)	28.39(26.7%)	5.436(27.5%)				
LHK-T-TR/068W02-2	4.978(12.2%)	91.82(2.0%)	3.154(27.7%)		5.661(21.4%)				59.30(41.0%)C

*.DOUBLE SAME DATA FOR THE SAME SAMPLE

**.TRIPLE SAME DATA FOR THE SAME SAMPLE

-1 OR -2-DIFFERENT DATE FOR THE SAME SAMPLE

TABLE OF NUCLIDES MEASUREMENTS

DATE:JAN.90

TITLE: LDEF

FILE FROM: LLL

NUCLIDES SAMPLES/NO.	SC-46 (PCi/kg)	MN-54 (PCi/kg)	CO-56 (PCi/kg)	CO-57 (PCi/kg)	CO-58 (PCi/kg)
LHJ(BOTTOMUP)072L02	4.713(16.7%)	94.36(2.1%)	4.444(18.6%)	19.21(11.9%)	5.151(52.4%)
LHJ(TOPUP)068L03	4.814(16.6%)	94.38(2.1%)	4.160(20.0%)	21.13(11.7%)	6.246(65.4%)
LHK(BOTTOMUP)072W02	4.342(11.8%)	93.45(1.7%)	3.280(17.5%)	27.13(15.3%)	5.562(14.0%)
LHK(TOPUP)068W03	4.670(10.9%)	93.00(1.8%)	3.516(22.7%)	28.61(14.4%)	5.291(15.2%)
RHJ(TOPUP)079W03	4.366(11.1%)	86.66(1.8%)	3.343(23.2%)	23.12(15.4%)	5.370(20.3%)
RHJ(TOPUP)075L03	3.542(27.2%)	87.00(2.7%)	3.058(33.5%)	22.21(12.6%)	5.053(48.3%)
RHK(TOPUP)075W03	3.756(14.2%)	84.34(1.8%)	3.389(17.6%)	28.56(13.0%)	4.660(19.4%)
RHK(TOPUP)079L03	4.342(19.8%)	88.18(2.1%)	3.536(23.7%)	20.77(12.4%)	4.183(86.4%)

	CO-60 (PCi/kg)	CR-51 (PCi/kg)	V-48 (PCi/kg)
LHJ(BOTTOMUP)072L02	2.422(17.2%)		
LHJ(TOPUP)068L03	2.687(17.7%)		
LHK(BOTTOMUP)072W02	1.138(29.6%)		
LHK(TOPUP)068W03	1.038(37.9%)	54.68(38.7%)	6.532(30.1%)
RHJ(TOPUP)079W03	14.27(24.0%)		
RHJ(TOPUP)075L03	23.60(17.1%)	52.31(43.8%)	
RHK(TOPUP)075W03	1.491(22.7%)		
RHK(TOPUP)079L03	1.998(23.7%)		

TABLE OF NUCIDES MEASUREMENTS

DATE: MAY,91

TITLE: LDEF

FILE FROM: CAMP/RUTH

LLL(MAY 13.91)

SAMPLE/SNO.	NUCLIDES (PCi/kg)	NA-22 (PCi/kg)	K-40 (PCi/kg)	CO-60 (PCi/kg)	TH-228 (PCi/kg)	RA-228 (PCi/kg)	U-235 (PCi/kg)	MN-54 (PCi/kg)
CA-W-SPN-1(136W01)	66.46(13.0%)							
CA-W-SPN-2(141L01)	78.66(9.7%)							
CA-W-SPN-3(141W01)	64.09(16.5%)							
CA-W-SPN-4(141C01)	61.10(8.5%)							
CA-W-SPN-5(141D01)	57.76(7.9%)							
CA-W-EAS-1(137801)	88.76(21.2%)							
CA-W-EAS-2(137701)	84.54(7.2%)							
CA-W-EAS-3(141F01)	80.56(6.4%)							
CA-W-EAS-4(141B01)	83.72(9.6%)							
CA-W-EAS-5(144W01)	67.20(16.9%)							
KP-2 KP-5(133G01)	135.1(6.0%)							
KP-8 KP-11(136G01)	105.8(7.8%)							
C-SS-1(135A01)	36.42(54.4%)							
C-SS-2(135B01)		1368(20.6%)						
C-SS-3(No Results)								
C-SS-4(No Results)								
C-SS-5(141A01)	8.009(48.7%)							
C-SS-6(No Results)		208.6(32.8%)						

NUCLIDES	NA-22 (PCi/kg)	K-40 (PCi/kg)	CO-60 (PCi/kg)	TH-228 (PCi/kg)	RA-228 (PCi/kg)	U-235 (PCi/kg)	MN-54 (PCi/kg)
C-SS-26(130W01)							
C-SS-27(NO RESULTS)							
C-SS-28(133D01)				2.064(30.7%)			
C-SS-29(133W01)				1.258(27.8%)			
ESR-8(3777-8)							
ESR-9(3777-9)							4.209(40.5%)

TABLE OF NUCLIDES MEASUREMENTS

DATE:JAN.91

TITLE: LDEF

FILE FROM: CAMP/McLEAN

SAMPLES(NO.)	STRAP G12AF (106701)	G12A1F-CO (096D01)	G12A2F-V (096F01)
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NUC(PCi/kg)

MN-54	126.7(19.9%)	91.34(4.2%)	
CO-56		22.08(17.4%)	
CO-57		302.0(1.8%)	
CO-58		116.1(17.1%)	
CO-60		26.27(8.8%)	
SC-46			15.90(32.8%)
ND-147			1582(50.3%)
RA-226			7.927(58.3%)
ZR-88			
SN-113			
TH-228			
TA-182			
RA-228			
LU-172			
LU-173			

SAMPLES(NO.)	G12B2F-NI (096A01)	G12B3F-IN (096B01)	G12B4F-TA (096C01)
NUC(PCi/kg)			

MN-54	25.43(13.4%)		
CO-56	28.58(16.9%)		
CO-57	402.7(8.7%)		
CO-58	62.29(11.9%)		
CO-60			
SC-46			
ND-147			
RA-226			6.489(44.1%)
ZR-88		17.15(18.2%)	
SN-113		21.59(18.2%)	
TH-228		253.6(27.1%)	
TA-182			34.90(15.6%)
RA-228			27.21(22.2%)
LU-172			10.50(6.2%)
LU-173			66.45(9.7%)

TABLE OF NUCLIDES MEASUREMENTS

DATE: JAN 90

TITLE: LOEF FILE FROM: CALMOSS

SAMPLESNO.	NUCLIDES	CO-57 (PCI/kg)	CR-51 (PCI/kg)	BE-7 (PCI/kg)	NA-22, 511 (PCI/kg)	CO-58 (PCI/kg)	MN-54 (PCI/kg)	CO-56, 846 1238 (PCI/kg)	SC-46, 889 1120 (PCI/kg)
LHDER-2(9041-2)	16.75(41.9%)	0	24.86(>100%)	0	0	0	104.3(10.9%)	0	0
RHDER-6(8941-6)	12.43(47.8%)	19.19(>100%)	23.51(>100%)	55.94(8.21%) 2.432(>100%)	4.865(>100%)	53.24(14.7%)	5.676(>100%) 88.38(29.1%)	0	94.32(45.6%)
LHDSP-6(9043-6)	11.89(43.2%)	26.49(>100%)	0	0	1.351(>100%)	74.05(29.9%)	2.973(>100%) 15.14(>100%)	0	0
RHDSP-6(8943-6)	14.05(34.6%)	0	37.84(>100%)	2.432(>100%) 1.081(>100%)	0	64.59(10.9%)	3.514(>100%) 0	0	0
RHDER-2(8941-2)	11.35(85.71%)	0	0	15.68(>100%) 4.324(>100%)	9.730(>100%)	134.6(11.6%)	4.054(>100%) 0	0	16.76(>100%)
RHDER-4(8941-4)	14.86(36.4%)	26.22(>100%)	2.703(>100%)	8.649(50%) 0	6.757(>100%)	75.95(9.96%)	0	31.62(88.89%)	0
LHDSP-2(9043-2)	16.29(27.2%)	0	4.595(>100%)	4.865(>100%) 0	0	94.05(14.4%)	0	1.622(>100%) 20.86(70.5%)	0
LHDER-6(9041-6)	13.24(46.9%)	42.16(>100%)	0	12.43(37.0%) 10.27(>100%)	0	73.78(12.1%)	0	3.784(>100%)	0
RHDSP-2(8943-2)	8.65(>100%)	0	174.1(>100%)	30.54(31.0%) 13.78(84.3%)	2.973(>100%)	92.16(19.6%)	15.13(>100%) 27.84(>100%)	0	13.51(>100%)
RHDSP-4(8943-4)	7.568(85.7%)	0	67.57(>100%)	14.86(32.7%) 0	12.97(87.5%) 0	65.95(13.9%)	4.324(>100%) 90.27(42.8%)	0	6.757(>100%)

NUCLIDES SAMPLES/NO.	CO-57 (PCi/kg)	CR-51 (PCi/kg)	BE-7 (PCi/kg)	NA-22, 511 (PCi/kg)	CO-58 (PCi/kg)	MN-54 (PCi/kg)	CO-56, 846 1238 (PCi/kg)	SC-46, 889 1120 (PCi/kg)
LHDSP-4(9043-4)	6.216(>100%)	74.05(>100%)	0	5.405(100%) 3.514(>100%)	9.459(>100%) 0	88.92(11.6%) 96.76(11.7%)	20.00(62.2%) 82.70(52.0%) 25.14(>100%)	0 55.68(43.7%) 0 31.89(83.1%)
LHDER-4(9041-4)	12.16(64.4%)	0	76.49(>100%)	8.462(63.6%) 0	0	9.730(>100%) 25.14(>100%)	9.730(>100%) 25.14(>100%)	0 31.89(83.1%)
ESR-3(3777-3)	12.70(44.9%)	0	51.89(>100%)	72.97(7.04%) 49.73(13.0%)	4.595(>100%) 0	0	14.05(69.2%) 36.49(95.6%)	0 6.486(>100%)
ESR-8(3777-8)	7.838(>100%)	0	170.8(>100%)	90.81(8.33%) 61.08(14.6%)	0	32.43(41.7%) 0	0 36.22(>100%)	1.892(>100%) 33.78(89.6%)
ESR-7(3777-7)	11.35(76.2%)	0	757.3(33.2%)	89.19(8.79%) 45.14(21.6%)	0	0	2.162(>100%) 85.68(68.1%)	0 7.027(>100%)
ESR-6(3777-6)	6.486(>100%)	444.6(>100%)	219.2(>100%)	87.29(8.98%) 46.22(19.9%)	0	15.95(88.1%) 0	0 0	0 25.41(>100%)
ESR-9(3777-9)	5.946(>100%)	1378(>100%)	209.5(>100%)	72.70(11.2%) 38.65(25.9%)	0	13.51(>100%) 0	0 0	17.57(>100%) 43.78(>100%)

TABLE OF NUCLIDES MEASUREMENTS

DATE: OCT. 90

TITLE: LDEF

FILE FROM: CAL/MOSS

SAMPLE NO.	NUCLIDES	NA 22, 511			CO-58			MN-54			CO-56, 846			SC-46, 889		
		CO-57 (PCi/kg)	CR-51 (PCi/kg)	BE-7 (PCi/kg)	(PCi/kg)	(PCi/kg)	(PCi/kg)	(PCi/kg)								
LHDER-2(9041-2)	19.45(41.7%)	0	28.11(>100%)	0	0	6.486(>100%)	71.35(14.4%)	119.7(10.8%)	0	0	0	0	0	0	0	
RHDER-6(8941-6)	18.38(47.1%)	25.68(>100%)	31.08(>100%)	73.51(8.46%)	3.243(>100%)	6.486(>100%)	71.35(14.4%)	7.568(>100%)	118.1(29.1%)	125.4(15.1%)	0	0	0	0	0	
LHDSP-6(9043-6)	17.57(43.1%)	35.14(>100%)	0	0	3.243(>100%)	1.622(>100%)	98.92(9.84%)	20.00(>100%)	3.784(>100%)	20.00(>100%)	0	0	0	0	0	
RHDSP-6(8943-6)	20.54(35.5%)	0	49.73(>100%)	2.702(>100%)	1.622(>100%)	0	86.22(11.0%)	4.865(>100%)	0	4.865(>100%)	0	0	0	0	0	
RHDER-2(8941-2)	12.97(85.4%)	0	0	17.30(59.4%)	11.08(>100%)	11.08(>100%)	151.4(11.6%)	4.595(>100%)	0	4.595(>100%)	0	0	0	0	0	
RHDER-4(8941-4)	18.37(35.3%)	31.35(>100%)	3.243(>100%)	10.54(51.3%)	8.108(>100%)	93.51(10.1%)	0	0	38.92(88.9%)	0	0	0	0	0	0	
LHDSP-2(9043-2)	36.22(26.9%)	0	5.405(>100%)	5.405(>100%)	0	0	107.8(14.3%)	0	0	0	1.892(>100%)	10.54(>100%)	0	0	0	
LHDER-6(9041-6)	19.46(47.2%)	56.21(>100%)	0	16.49(37.7%)	0	98.65(12.1%)	0	48.11(99.4%)	0	0	0	5.135(>100%)	0	0	0	
RHDSP-2(8943-2)	10.00(>100%)	0	193.5(>100%)	33.78(31.2%)	3.514(>100%)	103.5(19.8%)	0	17.02(>100%)	0	0	0	0	0	0	0	
RHDSP-4(8943-4)	9.459(85.7%)	0	81.62(>100%)	18.11(32.8%)	15.95(88.1%)	81.08(14.0%)	0	31.35(>100%)	15.14(>100%)	0	44.86(70.3%)	0	0	0	0	
LHDSP-4(9043-4)	7.568(>100%)	88.92(>100%)	0	6.757(96%)	11.62(>100%)	109.7(11.6%)	0	31.08(>100%)	24.59(62.6%)	0	10.19(52.0%)	68.11(43.6%)	0	0	0	
LHDER-4(9041-4)	15.14(64.3%)	0	92.42(>100%)	10.81(62.5%)	0	119.2(11.6%)	0	11.89(>100%)	0	0	0	38.92(83.3%)	0	0	0	

TABLE OF NUCLIDES MEASUREMENTS

DATE: AUG.90

TITLE: LDEF

FILE FROM: REEDY

LOS ALAMOS

SAMPLES/NO.	NUCLIDES	MN-54 (PCi/kg)	NA-22 (PCi/kg)	CO-57 (PCi/kg)	511-NA22 (PCi/kg)
RHDER-2(8941-2)		120.0(26.8%)		31.08(69.6%)	
RHDER-3(8941-3)		118.9(18.9%)		22.97(67.1%)	
RHDER-4(8941-4)		93.78(20.4%)		12.97(89.5%)	
RHDER-5(8941-5)		85.41(19.6%)		10.54(>100%)	
RHDER-6(8941-6)		92.97(19.2%)		9.730(100%)	
RHDSP-2(8943-2)		102.2(27.8%)		46.48(82.0%)	
RHDSP-3(8943-3)		99.19(22.6%)		0	
RHDSP-4(8943-4)		88.92(22.8%)		13.24(89.8%)	
RHDSP-5(8943-5)		78.65(29.9%)		35.95(62.4%)	
RHDSP-6(8943-6)		71.02(23.5%)		0	
LHDER-2(9041-2)		125.9(27.5%)		31.89(52.5%)	
LHDER-3(9041-3)		118.9(20.5%)		29.73(38.2%)	
LHDER-4(9041-4)		114.9(12.0%)		19.46(52.8%)	

SAMPLES/NO.	NUCLIDES	MN-54 (PCI/kg)	NA-22 (PCI/kg)	CO-57 (PCI/kg)	511-NA22 (PCI/kg)
LHDER-5(9041-5)	105.1(12.3%)			12.16(68.9%)	
LHDER-6(9041-6)	98.65(15.3%)			21.35(43.0%)	
LHDSP-2(9043-2)	82.97(63.6%)			27.38(63.6%)	
LHDSP-3(9043-3)	109.5(15.3%)			28.11(38.5%)	
LHDSP-4(9043-4)	90.27(19.8%)			12.43(97.8%)	
LHDSP-5(9043-5)	95.68(17.5%)			20.27(30.6%)	
LHDSP-6(9043-6)	85.14(19.7%)			20.81(>100%)	
ESR-3(3777-3)		118.1(16.9%)			118.4(16.9%)
ESR-6(3777-6)		129.2(16.9%)			113.2(21.5%)
ESR-7(3777-7)		131.9(21.7%)			125.7(23.4%)
ESR-8(3777-8)		141.9(23.8%)			147.8(20.7%)
ESR-9(3777-9)		135.1(15.4%)			126.8(17.9%)

TABLE OF NUCIDES MEASUREMENTS

DATE: OCT.90

TITLE: LDEF

FILE FROM: REEDY

LOS ALAMOS

SAMPLES/NO.	MN-54 (PCi/kg)	NA-22 (PCi/kg)	NUC CO-57 (PCi/kg)	511-NA22 (PCi/kg)
RHDER-2(8941-2)	115.9(26.8%)		30.00(69.3%)	
RHDER-3(8941-3)	113.0(18.9%)		21.89(66.7%)	
RHDER-4(8941-4)	87.30(20.4%)		12.16(88.9%)	
RHDER-5(8941-5)	79.46(19.7%)		10.27(>100%)	
RHDER-6(8941-6)	88.11(19.3%)		10.27(97.4%)	
RHDSP-2(8943-2)	96.84(27.9%)		45.14(82.0%)	
RHDSP-3(8943-3)	94.32(22.6%)		0	
RHDSP-4(8943-4)	83.24(22.7%)		12.43(89.1%)	
RHDSP-5(8943-5)	73.78(29.7%)		35.14(62.3%)	
RHDSP-6(8943-6)	70.81(23.7%)		0	
LHDER-2(9041-2)	121.4(27.4%)		30.81(52.6%)	
LHDER-3(9041-3)	113.0(20.3%)		28.1(37.5%)	
LHDER-4(9041-4)	107.8(12.0%)		18.38(52.9%)	
LHDER-5(9041-5)	98.65(12.3%)		11.89(68.2%)	
LHDER-6(9041-6)	93.78(15.3%)		22.16(43.9%)	
LHDSP-2(9043-2)	80.00(36.5%)		23.24(62.8%)	
LHDSP-3(9043-3)	104.1(15.3%)		26.76(38.4%)	
LHDSP-4(9043-4)	84.32(19.9%)		11.62(97.7%)	
LHDSP-5(9043-5)	89.73(17.5%)		19.73(30.1%)	
LHDSP-6(9043-6)	80.27(19.5%)		21.62(>100%)	
ESR-3(3777-3)		103.2(19.3%)		99.73(17.1%)
ESR-6(3777-6)		113.8(16.9%)		96.76(21.5%)
ESR-7(3777-7)		114.1(21.6%)		106.2(23.2%)
ESR-8(3777-8)		121.9(23.7%)		124.9(20.8%)
ESR-9(3777-9)		117.6(15.4%)		107.8(18.0%)

1.MN-54 AND CO-57: ACTIVITIES IN THE TRUNNION LAYERS

2.NA-22 : ACTIVITIES IN THE ALUMINIUM SAMPLES

FILE FROM: LOS ALAMOS/MOSS&REEDY DATE: 2-8 JUNE 1991

ACTIVITIES IN THE TRUNNION LAYERS(PCi/kg)

SAMPLE	MN-54		CO-57	
	33%&54%	80%	33%&54%	80%
	DETECTORS	DETECTOR	DETECTORS	DETECTOR
LHDSP2	95(37%)	126(14%)	27(63%)	41(27%)
LHDSP3	116(16%)		30(37%)	
LHDSP4	86(20%)	111(12%)	12(100%)	8(>100%)
LHDSP5	89(18%)		20(30%)	
LHDSP6	79(20%)	98(10%)	21(>100%)	17(41%)
LHDER2	145(28%)	140(11%)	36(53%)	22(41%)
LHDER3	126(21%)		31(39%)	
LHDER4	109(12%)	121(12%)	19(53%)	15(67%)
LHDER5	98(12%)		12(67%)	
LHDER6	93(15%)	97(12%)	22(41%)	19(47%)
RHDSP2	99(28%)	104(20%)	45(82%)	10(>100%)
RHDSP3	94(21%)		0	
RHDSP4	83(23%)	81(14%)	12(92%)	9(89%)
RHDSP5	73(30%)		35(63%)	
RHDSP6	70(24%)	85(11%)	0	20(35%)
RHDER2	116(27%)	151(12%)	30(70%)	13(85%)
RHDER3	113(19%)		22(68%)	
RHDER4	87(21%)	94(10%)	12(92%)	18(39%)
RHDER5	79(20%)		10(>100%)	
RHDER6	87(20%)	70(14%)	10(100%)	18(44%)

ACTIVITIES IN THE ALUMINUM SAMPLES(PCi/kg)

SAMPLE NA-22

ESR3	103(17%)
ESR6	113(17%)
ESR7	114(22%)
ESR8	122(24%)
ESR9	117(15%)
KP 1	135(13%)
KP12	140(12%)

ACTIVITIES IN THE TITANIUM ALLOY SAMPLES(PCi/kg)

SAMPLE NA-22 SC-46

916AC1	16(50%)	<90(3SIGMA)
920FC2	20(45%)	<110(3SIGMA)

Activity in Aluminum Samples

Sample	Na-22 Activity (pCi/kg)
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ESR 3	103 +/- 17
ESR 6	113 +/- 19
ESR 7	114 +/- 25
ESR 8	122 +/- 29
ESR 9	117 +/- 18
KP 1	135 +/- 18
KP 12	140 +/- 17

Activity in Titanium Alloy Samples

Sample	Activity (pCi/kg)	
	Na-22	Sc-46

916AC1	16 +/- 8	<90 (3 σ)
920FC2	20 +/- 9	<110 (3 σ)

Sample		Activity (picoCuries/kg)				Co-57 Detector
		Mn-54	33% and 54% Detectors	80% Detector	33% and 54% Detectors	
LH, D, Space, 2	95 +/- 35	126 +/- 18		27 +/- 17		41 +/- 11
LH, D, Space, 3	116 +/- 18			30 +/- 11		
LH, D, Space, 4	86 +/- 17	111 +/- 13		12 +/- 12		8 +/- 9
LH, D, Space, 5	89 +/- 16			20 +/- 6		
LH, D, Space, 6	79 +/- 16	98 +/- 10	21 +/- 23			17 +/- 7
LH, D, Earth, 2	145 +/- 40	140 +/- 15	36 +/- 19			22 +/- 9
LH, D, Earth, 3	126 +/- 26		31 +/- 12			
LH, D, Earth, 4	109 +/- 13	121 +/- 14	19 +/- 10			15 +/- 10
LH, D, Earth, 5	98 +/- 12		12 +/- 8			
LH, D, Earth, 6	93 +/- 14	97 +/- 12	22 +/- 9			19 +/- 9
RH, D, Space, 2	99 +/- 28	104 +/- 21	45 +/- 37			10 +/- 13
RH, D, Space, 3	94 +/- 21		(-)4 +/- 11			
RH, D, Space, 4	83 +/- 19	81 +/- 11	12 +/- 11			9 +/- 8
RH, D, Space, 5	73 +/- 22		35 +/- 22			
RH, D, Space, 6	70 +/- 17	85 +/- 9	(-)9 +/- 29			20 +/- 7
RH, D, Earth, 2	116 +/- 31	151 +/- 18	30 +/- 21			13 +/- 11
RH, D, Earth, 3	113 +/- 21		22 +/- 15			
RH, D, Earth, 4	87 +/- 18	94 +/- 9	12 +/- 11			18 +/- 7
RH, D, Earth, 5	79 +/- 16		10 +/- 15			
RH, D, Earth, 6	87 +/- 17	70 +/- 10	10 +/- 10			18 +/- 8

TABLE OF NUCLIDES MEASUREMENTS

DATE: JAN 20, 90

TITLE: LDEF
FILE FROM: C.E.FREDERICK
TVA(APR.3,90)

NUCLIDES	MN-54 (PCI/sa)	CO-57 (PCI/sa)
LH-E/001662-6*	35.00(6.69%)	2.95(15.9%)
LH-E/001662-6**	35.62(6.09%)	2.64(19.3%)
RH-E-001663-4*	30.81(7.37%)	1.66(26.5%)
RH-E-001663-4**	30.28(5.94%)	1.92(18.8%)

*-LABEL TOWARD DETECTOR

**-LABEL AWAY FROM DETECTOR

TABLE OF NUCIDES MEASUREMENTS

TITLE: LDEF
FILE FROM: C.E.FREDERICK
DATE: JAN.20,90

SAMPLES/NO.	NUCLIDES NA-22 (PCi/kg)	NUCLIDES BE-7 (PCi/kg)	SAMPLES/NO.	NUCLIDES NA-22 (PCi/kg)	NUCLIDES BE-7 (PCi/kg)
B1-3-CP(ESU 002140-2)	36.2(21.0%)		H07-6(002797-9)		NO RESULTS
B2-3-CP(ESU 002142-8)	39.6(12.8%)		G10_7(002798-7)		NO RESULTS
B11-3-CP(ESU 002145-1)	31.3(14.5%)	495.5(13.5%)	G02-12(002799-5)		NO RESULTS
B11-3-CP(ESD 002145-1)	27.0(13.1%)	409.1(14.6%)	G10-3(002800-1)		25.6(24.9%)
B12-3-CP(ESD 002143-6)	31.6(15.9%)	199.1(20.4%)	H03-3(002802-7)		NO RESULTS
C3-7-CP(ESU 002147-7)*	7.92(11.4%)*		H07-9(002803-5)		NO RESULTS
C4-7-CP(ESU 002133-7)	42.6(13.1%)		G06-1(002804-3)		NO RESULTS
C8-7-CP(ESU 002139-4)	24.6(16.3%)	888.5(10.9%)	H11-10(002805-0)		NO RESULTS
C8-7-CP(ESD 002139-4)	17.5(17.1%)	384.7(14.5%)	H12-3(002806-8)		20.6(18.6%)
C9-7-CP(ESU 002146-9)	55.3(15.1%)	1126.0(13.0%)	H11-4(002807-6)		37.8(40.7%)
C9-7-CP(ESD 002146-9)	52.2(14.2%)	611.1(11.1%)	H5-10(002808-4)		27.4(23.5%)

SAMPLES/NO.	NUCLIDES	NA-22 (PCi/kg)	BE-7 (PCi/kg)	SAMPLES/NO.	NUCLIDES	NA-22 (PCi/kg)	BE-7 (PCi/kg)
D3-5-CP(ESU 002150-1)	58.1(14.7%)			H3-10(002809-2)	NO RESULTS		
D3-2-CP(ESU 002195-6)	97.7(11.8%)			H12-3-CP(002810-0)	74.1(13.8%)		
D3-4-CP(ESU 002193-1)	103.6(13.6%)			G2-4-CP(002811-8)	86.1(16.5%)		
D4-4-CP(ESU 002151-9)	51.7(9.83%)			H3-3-CP(002812-6)	75.6(11.9%)		
D7-2-CP(ESU 002152-7)	35.9(11.1%)			H11-10-CP(002813-4)	82.9(18.5%)		
D7-2-CP(ESD 002152-7)	34.3(13.1%)			H11-4-CP(002814-2)	84.0(16.5%)		
D8-2-CP(ESU 002153-5)	35.9(15.5%)			G10-3-CP(002815-9)	71.8(16.0%)		
D8-2-CP(ESD 002153-5)	27.4(20.3%)			G2-12-CP(002816-7)	77.6(14.8%)		
D8-8-CP(ESU 002196-4)	54.6(18.8%)			G6-1-CP(002817-5)	77.1(16.6%)		
D8-8-CP(ESD 002196-4)	57.4(13.4%)			G10-7-CP(002818-3)	82.2(14.0%)		
D9-8-CP(ESU 002194-9)	73.5(15.7%)			H3-10-CP(002819-1)	91.3(19.5%)		
D9-8-CP(ESD 002194-9)	53.6(14.4%)			H5-10-CP(002820-9)	68.8(18.7%)		
D9-2-CP(ESU 002134-5)	28.3(17.6%)			H7-6-CP(002821-7)	74.3(12.1%)		
D9-2-CP(ESD 002134-5)	16.9(23.5%)			H7-9-CP(002822-5)	76.3(20.1%)		

SAMPLES/NO.	NUCLIDES	NA-22 (PCi/kg)	BE-7 (PCi/kg)	NUCLIDES	NA-22 (PCi/kg)	BE-7 (PCi/kg)
D10-2-CP(ESD 002192-3)	45.1(22.7%)	1089.1(13.4%)	B11-3-CP(ESU 002145-1)	26.7(7.56%)	508.1(8.45%)	
D10-4-CP(ESU 002144-4)	27.1(16.9%)	696.2(16.5%)	B12-3-CP(ESU 002143-6)	29.0(12.1%)	237.4(8.24%)	
D10-4-CP(ESD 002144-4)	28.4(28.6%)	452.1(13.4%)	C8-7-CP(ESU 002139-4)	29.8(8.49%)	578.9(8.05%)	
D10-2-CP(ESU 002192-3)	66.0(13.6%)	1519.2(8.19%)	C9-7-CP(ESU 002146-9)	49.8(7.46%)	1024.0(6.44%)	
D11-2-CP(ESU 002191-5)	69.5(24.0%)	1311.9(10.9%)	D8-2-CP(ESU 002153-5)	33.0(9.20%)	389.7(11.3%)	
D11-2-CP(ESD 002191-5)	66.2(13.6%)	1086.0(14.6%)	D9-2-CP(ESU 002134-5)	22.5(11.1%)	585.3(7.58%)	
D11-8-CP(ESU 002141-0)	28.9(12.2%)	396.8(12.2%)	D10-4-CP(ESU 002144-4)	26.8(7.58%)	599.2(6.35%)	
D11-8-CP(ESD 002141-0)	23.9(10.6%)	294.3(15.5%)	D11-8-CP(ESU 002141-0)	22.6(8.95%)	434.1(7.34%)	
G6-4-CP(ESU 002135-2)	38.7(12.9%)					
G6-10-CP(ESU 002136-0)	20.7(17.1%)					
H6-4-CP(ESU 002137-8)	28.2(14.1%)					
H6-9-CP(ESU 002138-6)	33.3(15.0%)					
H9-8-CP(ESU 002149-3)	30.1(15.0%)					
H9-12-CP(ESU 002148-5)	29.9(16.9%)					

ESU-ETCHED SIDE UP

ESD-ETCHED SIDE DOWN

*...pCi/sa

TABLE OF NUCLIDES MEASUREMENTS

DATE:JAN.20,90

TITLE: LDEF

FILE FROM: C.E.FREDERICK

NUCLIDES SAMPLES/NO.	NA-22 (PCi/sa)	BE-7 (PCi/sa)	TVA(OCT.5,90)
B1-3-CP(ESU 002140-2)	7.15(21.0%)		
B2-3-CP(ESU 002142-8)	7.83(12.8%)		
B11-3-CP(ESU 002145-1)	6.20(14.5%)	98.1(13.5%)	
B11-3-CP(ESD 002145-1)	5.35(13.1%)	81.00(14.6%)	
B12-3-CP(ESU 002143-6)	5.38(13.0%)	56.05(20.7%)	
B12-3-CP(ESD 002143-6)	6.30(15.9%)	39.70(20.4%)	
C3-7-CP(ESU 002147-7)	7.92(11.4%)		
C4-7-CP(ESU 002133-7)	8.42(13.1%)		
C8-7-CP(ESU 002139-4)	4.92(16.3%)	117.35(10.9%)	
C8-7-CP(ESD 002139-4)	3.50(17.1%)	76.78(14.5%)	
C9-7-CP(ESU 002146-9)	5.95(15.1%)	121.16(13.0%)	
C9-7-CP(ESD 002146-9)	5.62(14.2%)	65.75(11.1%)	
D3-5-CP(ESU 002150-1)	11.60(14.7%)		
D3-2-CP(ESU 002195-6)	7.60(11.8%)		
D3-4-CP(ESU 002193-1)	8.08(13.6%)		
D4-4-CP(ESU 002151-9)	10.17(9.83%)		
D7-2-CP(ESU 002152-7)	7.20(11.1%)	29.37(34.0%)	
D7-2-CP(ESD 002152-7)	6.88(13.1%)		
D8-2-CP(ESU 002153-5)	7.08(15.5%)	101.80(19.2%)	
D8-2-CP(ESD 002153-5)	5.40(20.3%)	98.65(17.1%)	
D8--8-CP(ESU 002196-4)	4.26(18.8%)	98.20(14.9%)	
D8--8-CP(ESD 002196-4)	4.48(13.4%)	68.38(18.3%)	

SAMPLES/NO.	NUCLIDES	
	NA-22 (PCi/sa)	BE-7 (PCi/sa)
D9-8-CP(ESU 002194-9)	5.72(15.7%)	97.21(12.6%)
D9-8-CP(ESD 002194-9)	4.17(14.4%)	80.00(14.3%)
D9-2-CP(ESU 002134-5)	5.67(17.6%)	123.71(10.3%)
D9-2-CP(ESD 002134-5)	3.40(23.5%)	85.26(14.7%)
D10-2-CP(ESD 002192-3)	3.52(22.7%)	84.95(13.4%)
D10-4-CP(ESU 002144-4)	5.34(16.9%)	137.23(16.5%)
D10-4-CP(ESD 002144-4)	5.59(28.6%)	89.10(13.4%)
D10-2-CP(ESU 002192-3)	5.15(13.6%)	118.50(8.19%)
D11-2-CP(ESU 002191-5)	5.42(24.0%)	102.33(10.9%)
D11-2-CP(ESD 002191-5)	5.16(13.6%)	84.71(14.6%)
D11-8-CP(ESU 002141-0)	5.72(12.2%)	78.49(12.2%)
D11-8-CP(ESD 002141-0)	4.72(10.6%)	58.21(15.5%)
G6-4-CP(ESU 002135-2)	7.77(12.9%)	
G6-10-CP(ESU 002136-0)	4.08(17.1%)	
H6-4-CP(ESU 002137-8)	5.64(14.1%)	
H6-9-CP(ESU 002138-6)	6.66(15.0%)	
H9-8-CP(ESU 002149-3)	6.02(15.0%)	
H9-12-CP(ESU 002148-5)	5.90(16.9%)	
H07-6(002797-9)	NO RESULTS	
G10_7(002798-7)	NO RESULTS	
G02-12(002799-5)	NO RESULTS	
G10-3(002800-1)	2.01(24.9%)	
G02-4(002801-9)	1.88926.6%)	

SAMPLES/NO.	NUCLIDES	
	NA-22 (PCi/sa)	BE-7 (PCi/sa)
H03-3(002802-7)	NO RESULTS	
H07-9(002803-5)	NO RESULTS	
G06-1(002804-3)	NO RESULTS	
H11-10(002805-0)	NO RESULTS	
H12-3(002806-8)	1.61(18.6%)	
H11-4(002807-6)	2.95(40.7%)	
H5-10(002808-4)	2.13(23.5%)	
H3-10(002809-2)	NO RESULTS	
H12-3-CP(002810-0)	5.78(13.8%)	
G2-4-CP(002811-8)	6.68(16.5%)	
H3-3-CP(002812-6)	5.90(11.9%)	
H11-10-CP(002813-4)	6.47(18.5%)	
H11-4-CP(002814-2)	6.55(16.5%)	
G10-3-CP(002815-9)	5.63(16.0%)	
G2-12-CP(002816-7)	6.08(14.8%)	
G6-1-CP(002817-5)	6.03(16.6%)	
G10-7-CP(002818-3)	6.44(14.0%)	
H3-10-CP(002819-1)	7.18(19.5%)	
H5-10-CP(002820-9)	5.34(18.7%)	
H7-6-CP(002821-7)	5.77(12.1%)	
H7-9-CP(002822-5)	5.97(20.1%)	
B11-3-CP(ESU 002145-1)	5.29(7.56%)	100.60(8.45%)
B12-3-CP(ESU 002143-6)	5.78(12.1%)	47.33(8.24%)

NUCLIDES		
SAMPLES/NO.	NA-22 (PCi/sa)	BE-7 (PCi/sa)
C8-7-CP(ESU 002139-4)	5.95(8.49%)	115.55(8.05%)
C9-7-CP(ESU 002146-9)	5.36(7.46%)	110.18(6.44%)
D8-2-CP(ESU 002153-5)	6.52(9.20%)	76.89(11.3%)
D9-2-CP(ESU 002134-5)	4.51(11.1%)	117.47(7.58%)
D10-4-CP(ESU 002144-4)	5.28(7.58%)	118.11(6.35%)
D11-8-CP(ESU 002141-0)	4.47(8.95%)	85.87(7.34%)

ESU--ETCHED SIDE UP
 ESD--ETCHED SIDE DOWN

TABLE OF NUCLIDES MEASUREMENTS

DATE: JAN 20, 90

TITLE: LDEF

TVA(OCT.5,90)

FILE FROM: C.E.FREDERICK

SAMPLES/NO.	NUCLIDES	NA-22 (PCi/kg)	BE-7 (PCi/kg)	SAMPLES/NO.	NUCLIDES	NA-22 (PCi/sa)	BE-7 (PCi/sa)
B1-3-SP(ESU 002167-5)	NO RESULTS			D8-2-SP(ESU 002156-8)	55.6(25.0%)		
B1-3-SP(ESD 002167-5)	NO RESULTS			D9-2-SP(ESU 002154-3)	NO RESULTS		
B2-3-SP(ESD 002162-6)	74.9(35.7%)			D10-4-SP(ESU 002164-2)	NO RESULTS		
B11-3-SP(ESD 002174-1)	NO RESULTS			D11-8-SP(ESU 002173-3)	NO RESULTS		
B12-3-SP(ESU 002161-8)	52.0(27.6%)			G6-10-SP(ESU 002168-3)	33.8(33.9%)		
C3-7-SP(ESD 002166-7)	NO RESULTS			G6-4-SP(ESU 002170-9)	57.8(24.9%)		
C4-7-SP(ESU 002163-4)	NO RESULTS			H6-9-SP(ESU 002169-1)	70.5(19.9%)		
C8-7-SP(ESD 002165-9)	NO RESULTS			H6-4-SP(ESD 002159-2)	50.4(26.9%)		
C9-7-SP(ESU 002160-0)	NO RESULTS			H8-8-SP(ESU 002172-5)	2.09(23.9%)*		
D3-5-SP(ESD 002155-0)	NO RESULTS			H9-12-SP(ESU 002171-7)	NO RESULTS		
D4-4-SP(ESU 002157-6)	66.9(24.8%)						
D7-2-SP(ESU 002158-4)	63.6(25.8%)						

ESU-ETCHED SIDE UP
ESD-ECHED SIDE DOWN
* -PCi/sa

TABLE OF NUCLIDES MEASUREMENTS

DATE: JAN.20,90

SAMPLES/NO.	NUCLIDES	NA-22 (PCi/sa)	BE-7 (PCi/sa)	FILE FROM: C.E.FREDERICK	NUCLIDES	NA-22 (PCi/sa)	TVA(OCT.5,90)	BE-7 (PCi/sa)
B1-3-SP(ESU 002167-5)	NO RESULTS			D8-2-SP(ESU 002156-8)	1.60(25.0%)			
B1-3-SP(ESD 002167-5)	NO RESULTS			D9-2-SP(ESU 002154-3)	NO RESULTS			
B2-3-SP(ESD 002162-6)	1.40(35.7%)			D10-4-SP(ESU 002164-2)	NO RESULTS			
B11-3-SP(ESD 002174-1)	NO RESULTS			D11-8-SP(ESU 002173-3)	NO RESULTS			
B12-3-SP(ESU 002161-8)	1.81(27.6%)			G6-10-SP(ESU 002168-3)	1.18(33.9%)			
C3-7-SP(ESD 002166-7)	NO RESULTS			G6-4-SP(ESU 002170-9)	2.01(24.9%)			
C4-7-SP(ESU 002163-4)	NO RESULTS			H6-9-SP(ESU 002169-1)	2.01(19.9%)			
C8-7-SP(ESD 002165-9)	NO RESULTS			H6-4-SP(ESD 002159-2)	1.86(26.9%)			
C9-7-SP(ESU 002160-0)	NO RESULTS			H8-8-SP(ESU 002172-5)	2.09(23.9%)			
D3-5-SP(ESD 002155-0)	NO RESULTS			H9-12-SP(ESU 002171-7)	NO RESULTS			
D4-4-SP(ESU 002157-6)	2.02924.8%							
D7-2-SP(ESU 002158-4)	1.94(25.8%)							

ESU-ETCHED SIDE UP
ESD-ECHED SIDE DOWN

TABLE OF NUCLIDES MEASUREMENTS

DATE:JAN.90

TITLE: LDEF

FILE FROM: W.G.WINN
SAVANNAH RIVEF (APR.18.90)

NUCLIDES

SAMPLES/NO.	NUCLIDES	BE-7 (PCi/kg)	SC-46 (PCi/kg)	CR-51 (PCi/kg)
LHP/A		0	3.37(10.7%)	26.00(43.5%)
LHP/B		2.41(>100%)	3.27(1.9%)	12.05(100%)
LHP/C		0	3.32(8.13%)	19.46(42.4%)
LHR/A		0	3.70(10.3%)	53.13(24.5%)
LHR/B		0	3.70(10.8%)	15.65(82.6%)
LHR/C		0	3.70(7.57%)	34.23(26.8%)
LHS/A		7.59(86.3%)	4.16(10.6%)	24.44(54.1%)
LHS/B		0	4.74(9.49%)	23.93(61.8%)
LHS/C		3.64(>100%)	4.44(7.20%)	24.21(40.7%)
RHP/A		0.24(>100%)	2.88(12.2%)	29.14(46.0%)
RHP/B		0	3.84(11.7%)	17.47(>100%)
RHP/C		0	3.24(8.33%)	25.12(43.2%)
RHR/A		10.29(61.9%)	3.72(9.95%)	46.55(34.6%)
RHR/B		0	3.79(14.8%)	27.66(81.2%)
RHR/C		5.95(89.1%)	3.74(8.28%)	40.14(32.6%)
RHS/A		3.45(>100%)	3.89(12.1%)	32.76(58.4%)
RHS/B		0	3.88(12.1%)	48.42(42.9%)
RHS/C		0.98(>100%)	3.89(8.48%)	39.96(35.2%)

SAMPLES/NO.	NUCLIDES		
	MN-54 (PCi/kg)	CO-56 (PCi/kg)	CO-57 (PCi/kg)
LHP/A	79.93(1.64%)	2.44(16.0%)	8.09(7.17%)
LHP/B	79.14(1.66%)	2.96(14.2%)	8.90(6.85%)
LHP/C	79.53(1.17%)	2.68(10.8%)	8.47(4.96%)
LHR/A	77.27(1.99%)	2.85(14.4%)	6.63(9.35%)
LHR/B	78.27(1.61%)	2.75(15.6%)	8.19(7.57%)
LHR/C	77.84(1.22%)	2.80(10.7%)	7.41(5.94%)
LHS/A	76.16(1.93%)	2.67(16.9%)	6.38(9.56%)
LHS/B	75.03(1.81%)	3.28(14.3%)	5.73(15.5%)
LHS/C	75.55(1.32%)	2.96(11.1%)	6.17(8.10%)
RHP/A	72.12(1.62%)	2.93(13.0%)	8.07(6.57%)
RHP/B	74.08(1.75%)	2.31(20.8%)	8.09(8.28%)
RHP/C	72.99(1.19%)	2.69(11.2%)	8.08(5.20%)
RHR/A	72.86(1.74%)	1.89(20.6%)	5.96(9.06%)
RHR/B	72.63(2.38%)	2.93(19.5%)	6.45(11.5%)
RHR/C	72.78(1.41%)	2.22(14.4%)	6.13(7.01%)
RHS/A	73.19(2.13%)	3.36(16.1%)	7.41(10.1%)
RHS/B	74.14(1.86%)	2.27(22.0%)	5.17(12.0%)
RHS/C	73.72(1.40%)	2.77(13.4%)	6.08(7.89%)

NUCLIDES

SAMPLES/NO.	CO-58 (PCi/kg)	CO-60 (PCi/kg)
LHP/A	5.06(12.1%)	1.29(16.3%)
LHP/B	4.00(16.0%)	1.75(13.1%)
LHP/C	4.56(9.65%)	1.51(10.6%)
LHR/A	4.75(13.9%)	1.61(14.9%)
LHR/B	4.40(14.3%)	1.45(15.2%)
LHR/C	4.57(10.1%)	1.52(10.5%)
LHS/A	4.73(14.6%)	1.88(13.3%)
LHS/B	5.80(12.2%)	1.45(17.2%)
LHS/C	5.25(9.52%)	1.66(10.8%)
RHP/A	4.92(12.0%)	1.64(12.2%)
RHP/B	2.82(25.2%)	1.55(14.8%)
RHP/C	4.07(11.1%)	1.60(9.38%)
RHR/A	3.88(16.8%)	1.46(15.1%)
RHR/B	4.93(19.1%)	1.17(23.1%)
RHR/C	4.22(12.8%)	1.34(12.7%)
RHS/A	4.17(18.7%)	1.61(17.4%)
RHS/B	4.91(16.1%)	1.19(19.3%)
RHS/C	4.54(12.3%)	1.36(13.2%)

A--LABEL FACING AWAY FROM DETECTOR

B--LABEL FACING DETECTOR

C--AVERAGE OF ABOVE-(1/) - WIEGHTED

TABLE OF NUCLIDES MEASUREMENTS

DATE:JAN.90

TITLE: LDEF

FILE FROM: W.G.WINN
SAVANNAH RIVE (APR.18,90)

NUCLIDES

SAMPLES/NO.	BE-7 (PCi/kg)	SC-46 (PCi/kg)	CR-51 (PCi/kg)
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LHP	6.02(90.8%)	3.79(7.65%)	3.95(>100%)
LHR	0	3.92(8.67%)	35.10(61.3%)
LHS	1.59(>100%)	4.29(5.82%)	20.86(69.7%)
RHP	13.37(40.2%)	3.79(8.71%)	55.21(27.6%)
RHR	10.17(37.1%)	3.32(7.23%)	17.36(59.8%)
RHS	3.86(>100%)	4.00(8.00%)	23.39(61.7%)

NUCLIDES

SAMPLES/NO.	CO-57 (PCi/kg)	CO-58 (PCi/kg)	CO-60 (PCi/kg)
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LHP	6.53(5.67%)	5.36(9.33%)	1.65(9.09%)
LHR	6.93(9.38%)	4.85(10.9%)	1.53(9.80%)
LHS	6.32(4.74%)	4.74(7.81%)	1.50(7.33%)
RHP	6.25(6.72%)	4.77(10.3%)	1.26(12.7%)
RHR	6.33(4.74%)	4.33(8.31%)	1.64(6.71%)
RHS	6.02(6.98%)	4.06(15.3%)	1.51(10.6%)

NUCLIDES

SAMPLES/NO.	MN-54 (PCi/kg)	CO-56 (PCi/kg)
LHP	79.48(1.27%)	2.62(11.8%)
LHR	75.76(1.28%)	2.48(14.1%)
LHS	75.24(0.98%)	2.29(10.9%)
RHP	71.99(1.39%)	2.63(12.5%)
RHR	72.73(1.03%)	2.50(9.60%)
RHS	75.52(1.31%)	2.69(12.3%)

TABLE OF NUCLIDES MEASUREMENTS

DATE:JAN.90

TITLE: LDEF

FILE FROM: W.G.WINN
SAVANNAH RIVER(JAN.7,91)

NUCLIDES

SAMPLES/NO.	BE-7 (PCi/kg)	SC-46 (PCi/kg)	CR-51 (PCi/kg)
LHB/A	8.68(>100%)	4.46(20.0%)	73.99(>100%)
LHB/B	0	4.20(18.8%)	72.91(>100%)
LHB/C	3.73(>100%)	4.31(13.7%)	73.56(>100%)
LHE/A	33.45(92.2%)	3.65(29.3%)	0
LHE/B	23.55(>100%)	5.31(17.9%)	0
LHE/C	28.27(75.3%)	4.57(15.5%)	0
LHF/A	0	2.88(23.3%)	105.68(>100%)
LHF/B	0	4.04(19.3%)	0
LHF/C	0	3.37(15.1%)	33.60(>100%)
RHB/A	18.18(>100%)	5.10(20.8%)	170.11(>100%)
RHB/B	56.34(45.2%)	4.53(66.7%)	117.01(>100%)
RHB/C	40.37(48.1%)	5.04(1.98%)	144.43(94.0%)
RHE/A	2.28(>100%)	2.06(43.2%)	205.54(71.4%)
RHE/B	14.90(>100%)	1.71(80.1%)	0
RHE/C	7.66(>100%)	1.96(38.3%)	35.78(>100%)
RHF/A	45.21(67.3%)	2.47(39.3%)	0
RHF/B	49.32(55.0%)	3.50(26.0%)	199.32(100%)
RHF/C	47.50(42.6%)	2.99(21.4%)	38.68(>100%)

SAMPLES/NO.	NUCLIDES		
	MN-54 (PCi/kg)	CO-56 (PCi/kg)	CO-57 (PCi/kg)
LHB/A	124.54(1.74%)	4.54(20.9%)	16.02(6.87%)
LHB/B	115.88(1.87%)	4.64(25.9%)	14.49(6.83%)
LHB/C	120.21(1.27%)	4.58(16.4%)	15.17(4.81%)
LHE/A	94.74(2.88%)	3.95(33.9%)	8.17(11.6%)
LHE/B	95.53(2.38%)	2.41(39.0%)	10.93(8.42%)
LHE/C	95.21(1.84%)	2.92(26.4%)	9.60(6.88%)
LHF/A	100.50(1.98%)	4.86(24.7%)	9.75(11.1%)
LHF/B	100.50(1.98%)	4.83(20.1%)	10.84(7.20%)
LHF/C	100.50(1.40%)	4.84(15.5%)	10.47(6.02%)
RHB/A	83.59(2.63%)	3.40(32.9%)	8.16(11.2%)
RHB/B	81.85(2.13%)	3.03(36.6%)	6.76(11.4%)
RHB/C	82.52(1.65%)	3.21(24.6%)	7.34(8.04%)
RHE/A	81.26(2.88%)	2.02(58.9%)	9.82(9.98%)
RHE/B	78.57(2.67%)	2.39(65.7%)	4.99(14.0%)
RHE/C	79.77(1.97%)	2.15(44.2%)	6.63(8.60%)
RHF/A	77.42(2.91%)	3.23(40.9%)	6.63(13.7%)
RHF/B	79.84(2.09%)	4.19(28.6%)	7.26(10.7%)
RHF/C	78.96(1.70%)	3.75(23.7%)	7.00(8.43%)

SAMPLES/NO.	NUCLIDES	
	CO-58 (PCi/kg)	CO-60 (PCi/kg)
LHB/A	4.48(37.1%)	2.58(10.9%)
LHB/B	2.22(71.6%)	1.52(15.8%)
LHB/C	3.31(34.7%)	1.96(9.18%)
LHE/A	0.21(>100%)	1.53(27.4%)
LHE/B	2.12(83.5%)	1.65(26.7%)
LHE/C	1.33(>100%)	1.59(18.9%)
LHF/A	5.39(31.9%)	1.22(30.3%)
LHF/B	2.97(52.5%)	1.47(15.6%)
LHF/C	4.06(28.6%)	1.40(13.6%)
RHB/A	4.76(41.8%)	1.20(27.5%)
RHB/B	4.61(35.8%)	1.63(23.3%)
RHB/C	4.67(27.2%)	1.39(18.0%)
RHE/A	1.19(>100%)	0.75(38.7%)
RHE/B	3.84(50.0%)	1.63(19.6%)
RHE/C	2.35(54.0%)	1.16(19.0%)
RHF/A	3.15(62.9%)	1.15(27.8%)
RHF/B	1.97(83.2%)	1.43(18.2%)
RHF/C	2.45(51.4%)	1.32(15.2%)

A--LABEL FACING AWAY FROM DETECTOR

B--LABEL FACING DETECTOR

C--AVERAGE OF ABOVE-(1/)-WEIGHTED

TABLE OF NUCLIDES MEASUREMENTS

DATE:JAN.20,90

TITLE: LDEF

FILE FROM: W.G.WINN

SAVANNAH RIVER

SAMPLES/NO.	NUCLIDES SC-46 (PCi/kg)	SAMPLES/NO.	NUCLIDES NA-22 (PCi/kg)
G12-A2-FNV/A	16.65(8.17%)	ESR-1/A	127.49(5.59%)
G12-A2-FNV/B	15.75(14.6%)	ESR-1/B	133.83(4.73%)
G12-A2-FNV/C	16.42(7.13%)	ESR-1/C	131.03(3.61%)
G12-A2-FNV/D	16.20(8.27%)	ESR-1/D	130.66(3.65%)
I-C9-V/A	18.81(12.1%)	ESR-5/A	134.62(2.94%)
I-C9-V/B	22.18(9.20%)	ESR-5/B	129.87(3.05%)
I-C9-V/C	20.67(7.35%)	ESR-5/C	132.24(2.12%)
I-C9-V/D	20.49(7.47%)	ESR-5/D	132.24(2.12%)
I-F2-V/A	18.42(14.0%)	HP-3/A	163.15(2.44%)
I-F2-V/B	24.26(19.7%)	HP-3/B	158.38(2.51%)
I-F2-V/C	19.74(11.5%)	HP-3/C	160.76(1.75%)
I-F2-V/D	21.39(12.8%)	HP-3/D	160.76(1.75%)
I-H12-VA/A	24.25(32.1%)	HP-10/A	116.20(3.43%)
I-H12-VA/B	15.68(>100%)	HP-10/B	101.07(6.30%)
I-H12-VA/C	23.47(3.17%)	HP-10/C	111.95(3.01%)
I-H12-VA/D	19.97(64.8%)	HP-10/D	108.63(3.45%)
I-H12-VB/A	27.80(25.8%)		
I-H12-VB/B	15.70(73.9%)		
I-H12-VB/C	24.45(24.9%)		
I-H12-VB/D	21.75(31.4%)		

A--LABEL FACING AWAY FROM

B--LABEL FACING DETECTOR

C--WEIGHTED AVERAGE OF (A,B)-(1/)-WEIGHTED

D--DIRECT AVERAGE OF (A,B)-EVEN-WEIGHTED

TABLE OF NUCIDES MEASUREMENTS

DATE: JAN.20,90

TITLE: LDEF

FILE FROM: W.G.WINN
SAVANNAH RIVER (JAN.7,91)

NUCLIDES

SAMPLES/NO.	MN-54 (PCi/kg)	CO-57 (PCi/kg)
RH-G-SP-2/A	92.29(3.95%)	18.12(14.8%)
RH-G-SP-2/B	94.92(6.15%)	23.17(26.4%)
RH-G-SP-2/C	95.18(3.26%)	18.93(13.0%)
RH-G-SP-2/D	95.10(3.62%)	20.64(16.2%)
RH-G-SP-3/A	89.38(3.43%)	16.35(14.1%)
RH-G-SP-3/B	77.10(5.97%)	16.95(4.77%)
RH-G-SP-3/C	85.60(2.98%)	16.53(11.7%)
RH-G-SP-3/D	83.24(3.06%)	16.65(12.7%)
RH-G-SP-4/A	79.63(2.64%)	15.25(10.8%)
RH-G-SP-4/B	75.61(5.32%)	13.25(28.3%)
RH-G-SP-4/C	78.82(2.28%)	14.92(10.1%)
RH-G-SP-4/D	77.62(2.90%)	14.25(14.4%)
RH-G-SP-5/A	73.95(2.76%)	13.50(14.4%)
RH-G-SP-5/B	67.82(3.01%)	15.98(14.8%)
RH-G-SP-5/C	70.89(2.03%)	14.50(10.4%)
RH-G-SP-5/D	70.89(2.03%)	14.74(10.4%)
RH-G-SP-6/A	72.35(2.89%)	14.63(15.8%)
RH-G-SP-6/B	68.17(3.68%)	18.46(15.8%)
RH-G-SP-6/C	70.64(2.28%)	16.11(11.2%)
RH-G-SP-6/D	70.26(2.32%)	16.55(11.2%)

A--LABEL FACING AWAY FROM DETECTOR

B--LABEL FACING DETECTOR

C--WEIGHTED AVERAGE OF (A,B)-(1/)-WEIGHTED

D--DIRECT AVERAGE OF (A,B)-EVEN-WEIGHTED

NUCLIDES

SAMPLES/NO.	MN-54 (PCi/kg)	CO-57 (PCi/kg)
RH-G-ER-2/A	105.39(3.46%)	22.35(14.0%)
RH-G-ER-2/B	91.53(6.77%)	14.57(29.2%)
RH-G-ER-2/C	101.83(3.08%)	19.60(12.9%)
RH-G-ER-2/D	98.46(3.66%)	18.46(14.3%)
RH-G-ER-3/A	98.05(2.74%)	17.3814.6%)
RH-G-ER-3/B	89.20(3.45%)	16.52(17.2%)
RH-G-ER-3/C	94.21(2.15%)	17.00(11.1%)
RH-G-ER-3/D	93.62(2.18%)	16.95(11.2%)
RH-G-ER-4/A	91.87(2.65%)	20.68(11.1%)
RH-G-ER-4/B	83.78(4.83%)	22.38(22.2%)
RH-G-ER-4/C	89.73(2.32%)	20.98(9.91%)
RH-G-ER-4/D	87.82(2.69%)	21.53(12.7%)
RH-G-ER-5/A	83.31(2.48%)	15.35(11.2%)
RH-G-ER-5/B	76.68(2.70%)	12.20(20.1%)
RH-G-ER-5/C	80.00(1.84%)	14.32(9.85%)
RH-G-ER-5/D	80.00(1.84%)	13.78(10.9%)
RH-G-ER-6/A	79.36(2.63%)	16.96(11.1%)
RH-G-ER-6/B	73.93(3.40%)	14.42(17.6%)
RH-G-ER-6/C	77.13(2.07%)	16.06(9.40%)
RH-G-ER-6/D	76.64(2.13%)	15.69(10.1%)

Isotopic Activities in pCi/kg Sample
 Willard G. Winn Trunnion Disk Results

Sample	Be-7	Sc-46	Cr-51	Mn-54	Co-56	Co-57	Co-58	Co-60
LHB		4.31 +/- .59		120.21 +/- 1.53	4.58 +/- .75	15.17 +/- .73	3.31 +/- 1.15	1.96 +/- .18
LHE		4.57 +/- .71		95.21 +/- 1.75	2.92 +/- .77	9.6 +/- .66	1.33 +/- 1.35	1.59 +/- .3
LHF		3.37 +/- .51		100.5 +/- 1.41	4.84 +/- .75	10.47 +/- .63	4.06 +/- 1.06	1.4 +/- .19
LHP	0.95 +/- 3.29	3.53 +/- .20	16.38 +/- 7.38	79.43 +/- .68	2.65 +/- .21	7.48 +/- .28	4.9 +/- .33	1.58 +/- .11
LHR	-7.48 +/- 3.65	3.78 +/- .21	34.35 +/- 8.43	76.71 +/- .68	2.66 +/- .23	7.23 +/- .36	4.68 +/- .35	1.52 +/- .11
LHS	2.56 +/- 3.28	4.34 +/- .19	23.14 +/- 8.15	75.25 +/- .59	2.53 +/- .20	6.22 +/- .25	4.92 +/- .30	1.55 +/- .09
RHB		5.04 +/- 1.00		82.52 +/- 1.36	3.21 +/- .79	7.34 +/- .59	4.67 +/- 1.27	1.39 +/- .25
RHE		1.96 +/- .75		79.77 +/- 1.57	2.15 +/- .95	6.63 +/- .57	2.35 +/- 1.27	1.16 +/- .22
RHF		2.99 +/- .64		78.98 +/- 1.34	3.75 +/- .89	7 +/- .59	2.45 +/- 1.26	1.32 +/- .20
RHP	5.36 +/- 3.53	3.46 +/- .21	35.22 +/- 8.84	72.56 +/- .66	2.67 +/- .22	7.28 +/- .30	4.39 +/- .33	1.45 +/- .11
RHR	8.75 +/- 3.07	3.48 +/- .19	26.16 +/- 8.13	72.75 +/- .60	2.41 +/- .19	6.2 +/- .24	4.29 +/- .3	1.55 +/- .09
RHS	2.67 +/- 3.74	3.94 +/- .23	31.89 +/- 10.08	74.66 +/- .71	2.73 +/- .25	6.01 +/- .32	4.32 +/- .41	1.44 +/- .12

Metal Slab Sample Results

Space side Trunnion Layers Sample	Activity (pCi/kg)			Earth Side Trunnion Layers Activity (pCi/kg)		
	Mn-54	Co-57	Mn-54	RHG-ER-2	98.46 +/- 3.60	17.50 +/- 2.51
RHG-SP-2	95.10 +/- 3.44	19.57 +/- 3.17	RHG-ER-2	98.46 +/- 3.60	17.50 +/- 2.51	
RHG-SP-3	83.24 +/- 2.77	14.78 +/- 1.88	RHG-ER-3	93.62 +/- 2.04	15.02 +/- 1.69	
RHG-SP-4	77.62 +/- 2.25	11.98 +/- 1.72	RHG-ER-4	87.82 +/- 2.36	17.48 +/- 2.22	
RHG-SP-5	70.89 +/- 1.44	12.18 +/- 1.27	RHG-ER-5	80.00 +/- 1.47	10.92 +/- 1.19	
RHG-SP-6	70.26 +/- 1.63	12.74 +/- 1.43	RHG-ER-6	76.64 +/- 1.63	12.07 +/- 1.22	

Vanadium		Aluminum	
Sample	Activity (pCi/kg)	Sample	Activity (pCi/kg)
Sc-46		Na-22	
G12-A2-FNV	16.00 +/- 1.32	ESR-1	90.60 +/- 3.31
I-C9-V	20.24 +/- 1.51	ESR-5	91.70 +/- 1.94
I-F2-V	21.12 +/- 2.70	KP-3	111.47 +/- 1.95
I-H12-VA	19.82 +/- 12.84	KP-10	75.33 +/- 2.60
I-H12-VB	21.59 +/- 6.77		

TABLE OF NUCLEIDES MEASUREMENTS

DATE: JAN. 90

TITLE: LDEF		FILE FROM BATTELLE		(MAY. 90)		DATE: JAN. 90	
SAMPLES(No.)	NUC/(PC/kg)	I-H12-TA-A I-H12-TA-B (A67E0 TA)*	I-H12-TA-A I-H12-TA-B (A67E1 TA)*	I-H12-V-A I-H12-V-B (A67C0 V)*	I-H12-V-A I-H12-V-B (A67C1 V)*	I-H12-NI-A I-H12-NI-B (A67A0 NI)*	I-H12-NI-A I-H12-NI-B (A67A1 NI)*
SC-46				11.82(23.6%) 12.04(23.6%)	15.41(31.0%) 15.70(31.0%)	72.05(10.7%) 72.31(10.7%)	72.01(6.87%) 72.27(6.87%)
MN-54						79.21(24.1%) 73.54(24.1%)	79.10(8.21%) 79.39(8.21%)
CO-56						393.9(4.20%) 395.3(4.20%)	395.7(6.88%) 397.1(6.88%)
CO-57						75.04(21.8%) 75.31(21.8%)	73.27(11.1%) 73.54(11.1%)
CO-58	33.19(20.8%) 33.81(20.8%)	30.14(16.7%) 30.70(16.7%)	28.11(19.1%) 28.63(19.1%)			7.568(45.1%) 7.596(45.1%)	
CO-60						15.30(12.7%)	
SN-113						220.2(18.2%)	153.3(54.0%) 153.9(54.0%)
W-1B1							
TA-182	59.21(51.4%) 60.31(51.4%)	27.01(69.3%) 27.52(69.3%)	23.84(85.0%) 24.29(85.0%)			198.6(10.7%) 202.3(10.7%)	180.3(13.4%) 183.7(13.4%)
TH-234						12.40(11.7%) 12.64(11.9%)	11.09(7.99%) 11.30(7.99%)
U-235							
GE-237M	1.033(100%) 1.053(100%)	7.274(100%) 7.410(100%)	6.472(100%) 6.592(100%)	1.073(100%) 1.093(100%)	.7459(100%) .7598(100%)	1.018(100%)	1.038(100%) 1.042(100%)

SAMPLES(NO.)	I-H12-TA-A I-H12-TA-B (A67E0.TA)*	I-H12-TA-A I-H12-TA-B (A67E1.TA)*	I-H12-TA-A I-H12-TA-B (A67E2.TA)*	I-H12-V-A I-H12-V-B (A67C0.V)*	I-H12-V-A I-H12-V-B (A67C1.V)*	I-H12-IN-A&B (A67B0.IN)*** (A67A1.NI)*	I-H12-Ni-A I-H12-Ni-B (A67A0.NI)*	I-H12-Ni-A I-H12-Ni-B (A67A1.NI)*
GE-237S								
GE-300M						3.195(36.7%)		
CD-356							322.5(42.4%) 323.7(42.4%)	
CD-356M	1.964(100%) 2.001(100%)	1.536(100%) 1.565(100%)	2.009(85.9%) 2.047(85.9%)	1.131(100%) 1.152(100%)	2.295(100%)	1181(57.0%) 1185(57.0%)	280.8(61.4%) 281.8(61.4%)	

*.LABEL TOWARD DETECTOR

**.LABEL AWAY FROM DETECTOR

***.SMALLER PART OF SCREW WAS FACING DETECTOR

TABLE OF NUCLIDES MEASUREMENTS

DATE: JAN. 90

NUC(PCI/mg)	TITLE: LDEF		FILE FROM: BATTELLE		(MAY, 90)
	SAMPLES(NO.)	I-H12-NI-A I-H12-NI-B (A67G0.NI)**	I-H12-NI-A I-H12-NI-B (A67G1.NI)*	I-H12-CO-A I-H12-CO-B (A67D0.CO)*	
MN-54	72.19(9.57%) 72.45(9.57%)	67.73(5.30%) 67.98(5.30%)	150.0(4.73%) 151.8(4.73%)	166.0(8.01%) 168.0(8.01%)	
CO-56	33.38(33.1%) 33.50(33.1%)	71.62(7.04%) 71.89(7.04%)			
CO-57	404.3(4.22%) 405.8(4.22%)	406.8(6.85%) 408.3(6.85%)	273.7(5.50%) 277.0(5.50%)	252.4(3.07%) 255.4(3.07%)	
CO-58	64.03(19.6%) 64.33(19.6%)	75.90(9.86%) 76.17(9.86%)	186.8(7.00%) 189.0(7.00%)	184.8(11.4%) 187.0(11.4%)	
CO-60		9.245(14.2%) 9.278(14.2%)	313.0(2.64%) 316.7(2.64%)		
AG-110M				17.28(100%) 17.48(100%)	
W-181			44.98(100%) 45.51(100%)		
GE-327M	1.565(100%) 1.571(100%)	.7608(100%) .7635(100%)	2.621(100%) 2.652(100%)	2.201(100%) 2.227(100%)	
CD-356M	6.568(76.2%) 6.592(76.2%)	1.8449100% 1.850(100%)	3.560(100%) 3.601(100%)		

*LABEL TOWARD DETECTOR

**LABEL AWAY FROM DETECTOR

LDEF

File From: Jim Reaves
Battelle/ Pacific Northwestern Labs

Sample I.D.	Co 60 foil	
	31.5% Detector	Nal(TL) Detector
G12-A-1-F-N	22.1 +/- .9	28.4 +/- .9
I-H12 (A & B)	167 +/- 5	173 +/- 3.5
I-C9	28.4 +/- 1	28.1 +/- 1

Sample	Na 22 Activity
EAN-1	82.5 +/- 3
EAN-2	72.1 +/- 1.1
EAN-3	61.0 +/- 1.3
EAN-4	56.0 +/- 1.0

Sample	Co 60 Activity
LHD S-2	0.8 +/- 0.3
LHD S-3	1.1 +/- 0.2
LHD S-5	1.0 +/- .2

Trunnion Section Slices

Trunnion Slice	Mn-54		Co-57		Trunnion		Mn-54		Co-57	
	pCi/kg	pCi/kg	pCi/kg	pCi/kg	RHG	Slice	pCi/kg	pCi/kg		
N1	171.3	+/-6.0	38.0	+/-3.6						
N2	137.3	+/-5.2	33.2	+/-1.6						
N3	117.5	+/-3.7	25.0	+/-1.6						
N4	105.1	+/-2.0	21.8	+/-0.9						
N5	95.0	+/-2.5	22.9	+/-1.6						
N6	93.1	+/-3.8	21.6	+/-2.5						
N7	97.0	+/-3.2	18.5	+/-2.2						
S7	82.6	+/-2.6	17.1	+/-2.2						
S6	73.4	+/-2.8	17.1	+/-1.6						
S5	69.3	+/-2.1	13.4	+/-1.3						
S4	68.4	+/-2.8	14.0	+/-1.7						
S3	75.8	+/-2.4	15.3	+/-1.1						
S2	88.2	+/-2.7	15.9	+/-1.0						
S1	107.3	+/-4.7	20.9	+/-3.0						

(not available)

Slice Number	Depth Interval (in.)	
	1	2
1	0.00	- 0.034
2	0.049	- 0.114
3	0.128	- 0.232
4	0.247	- 0.383
5	0.398	- 0.564
6	0.578	- 0.774
7	0.789	- 1.040

Cobalt Sample Activations

Sample	Nuclide	Activity (pCi/kg)
Co #C9	Mn-54	40.8 +/- 1.1
	Co-57	124.9 +/- 1.6
	Co-60	18.6 +/- 0.5
Co #G12	Mn-54	28.0 +/- 1.4
	Co-57	83.6 +/- 1.7
	Co-60	20.0 +/- 0.7

Indium Sample Activities

Sample	Nuclide	Activity (pCi/kg)
In #4	Rh-102	2.2 +/- 0.9
	Ag-110m	5.1 +/- 1.0
	Sn-113	54.0 +/- 3.6
	In-114m	105.0 +/- 20.0
In #C9	Rh-102	3.2 +/- 0.4
	Ag-110m	3.9 +/- 0.5
	Sn-113	40.9 +/- 2.7
	In-114m	55.0 +/- 35.0
In #G12	Rh-102	2.3 +/- 0.3
	Ag-110m	2.3 +/- 0.3
	Sn-113	21.0 +/- 1.2
	In-114m	35.0 +/- 15.0
In Bars	Rh-102	2.2 +/- 0.6
	Ag-110m	3.2 +/- 0.8
	Sn-113	35.1 +/- 4.2
	In-114m	190.0 +/- 115.0

Nickel Sample Activities

Sample	Nuclide	Activity (pCi/kg)
Ni #4	Sc-46	1.6 +/- 0.4
	Mn-54	27.3 +/- 0.9
	Co-56	33.2 +/- 1.3
	Co-57	322.0 +/- 2.0
	Co-58	41.7 +/- 1.6
	Co-60	4.7 +/- 0.3

Tantalum Sample Activity

Sample	Nuclide	Activity (pCi/kg)
Ta #4	Lu-172	35.9 +/- 1.1
	Lu-173	161.4 +/- 8.3
	Hf-175	36.6 +/- 1.9
	Ta-182	90.3 +/- 2.3

Vanadium Sample Activity

Sample	Nuclide	Activity (pCi/kg)
V #4	Sc-46	17.4 +/- 1.1

Target Composition	Isotope	Specific Activity (Nuclei/day)
Al 27	Be 7	30.01
	Na 22	967.8
	Na 24	460.1
Ti 47.9	V 48	884.8
	Sc 47	673.7
	Sc 46	1294
	Sc 44M	468.7
	Sc 43	3040
	K 43	19.22
Fe 56	Co 57	154.8
	Co 56	1568
	Mn 54	4628
	Fe 52	181.2
Ni 58.7	Mn54	679.3
	Co 58	1319
	Co 60	67.44
	Co 56	3086
	Co 57	3566
In 113	Sn 113	23.29
	In 111	94.73
In 115	Sn 113	311.2
	In 114	258.1
	In 111	618.5
	Cd 109	362.7
Ta 180.9	W 181	287
	W 179	815.3
	W 178	1396
	T 179	0.9577 E 13
	T 178	1874
	T 177	1703
	T 175	955
	H 175	824.4

Table 3
Nuclear Production Rate for 172 nmi LDEF Orbit

Target Composition	Isotope	Specific Activity (Nuclei/day)
Al 27	Be 7	30.01
	Na 22	967.8
	Na 24	460.1
Ti 47.9	V 48	884.8
	Sc 47	673.7
	Sc 46	1294
	Sc 44M	468.7
	Sc 43	3040
	K 43	19.22
Fe 56	Co 57	154.8
	Co 56	1568
	Mn 54	4628
	Fe 52	181.2
Ni 58.7	Mn54	679.3
	Co 58	1319
	Co 60	67.44
	Co 56	3086
	Co 57	3566
In 113	Sn 113	23.29
	In 111	94.73
In 115	Sn 113	311.2
	In 114	258.1
	In 111	618.5
	Cd 109	362.7
Ta 180.9	W 181	287
	W 179	815.3
	W 178	1396
	T 179	0.9577 E 13
	T 178	1874
	T 177	1703
	T 175	955
	H 175	824.4

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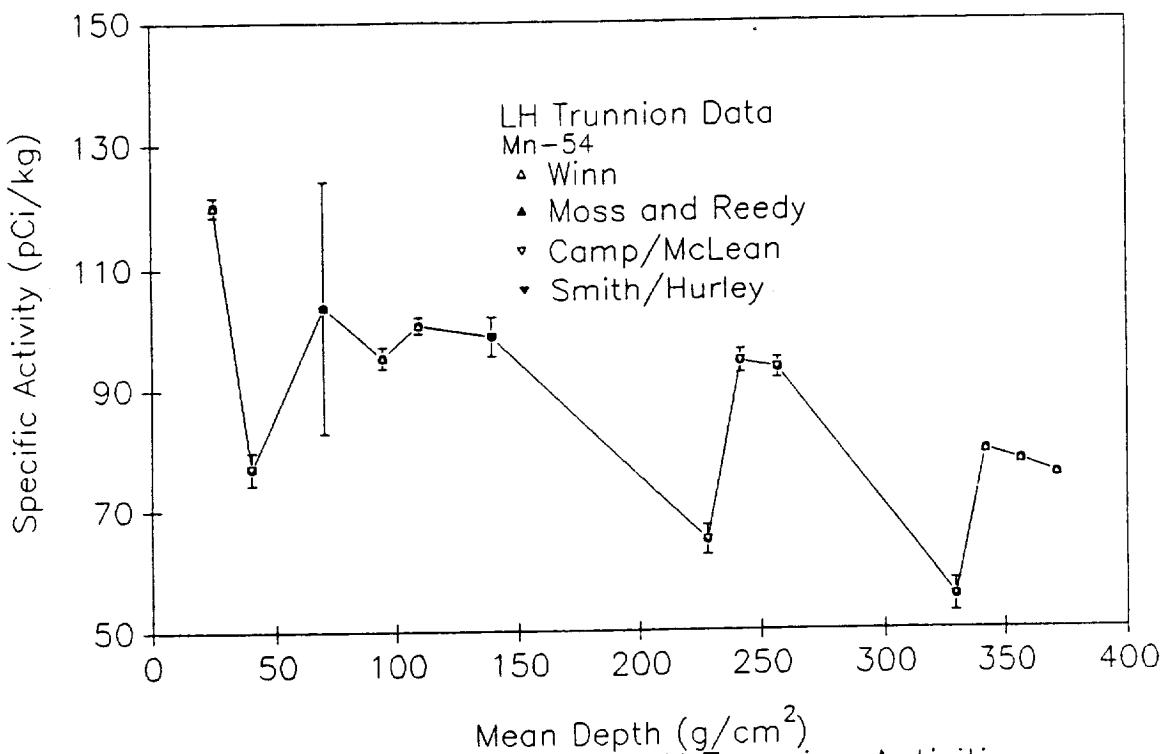


Figure 1. A Composite of LH Trunnion Activities as a Function of Depth along the Axis

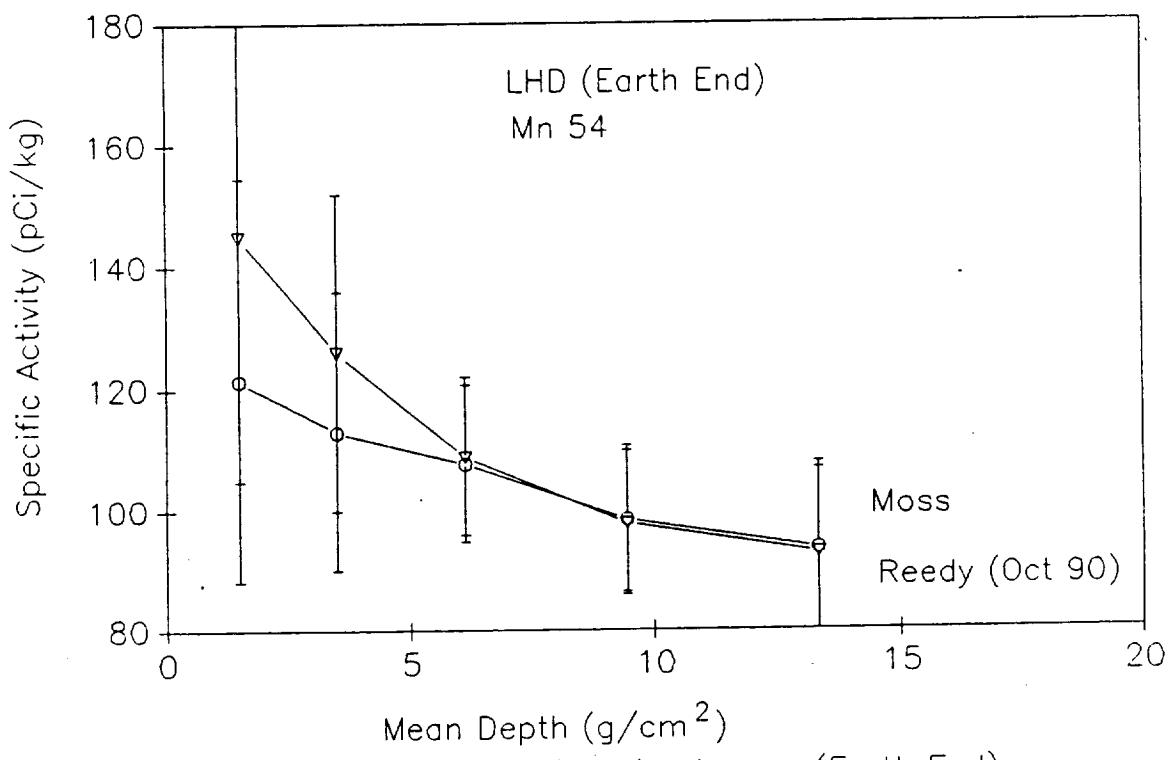


Figure 2. LHD Trunnion Layers (Earth End)
Counted by Moss and Reedy at LANL.

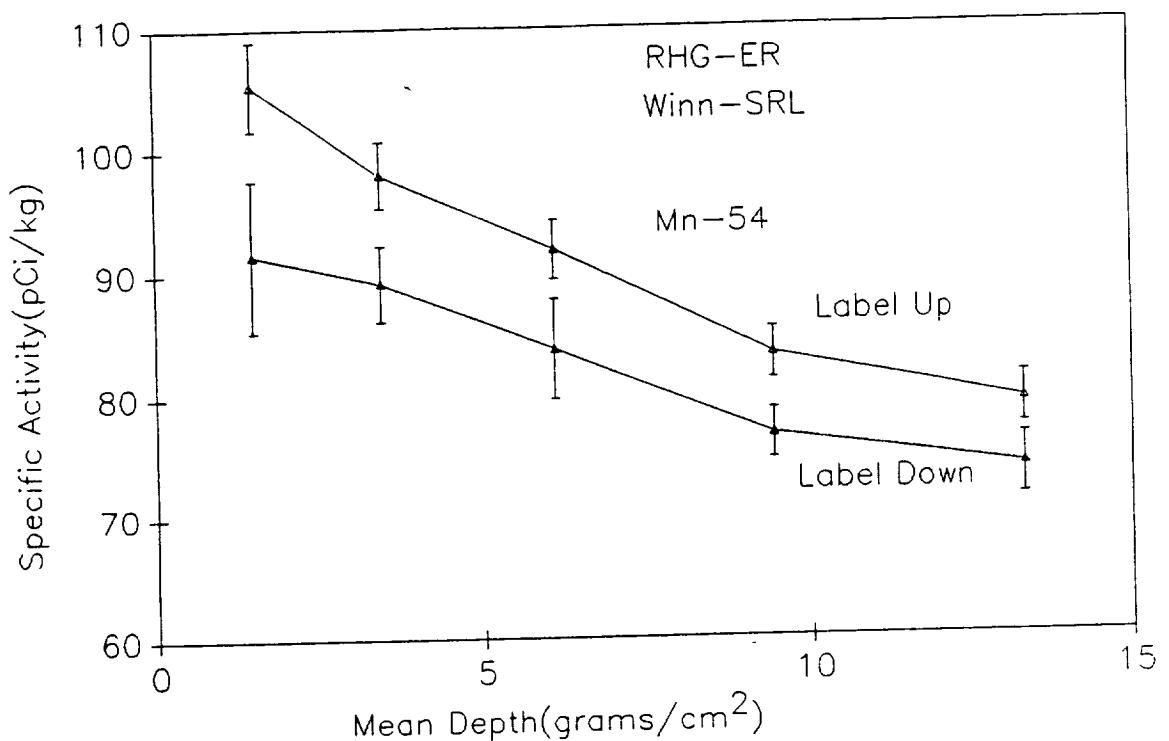


Figure 3. RHG Trunnion Layers (Earth End) Counted Face Up and Face Down.

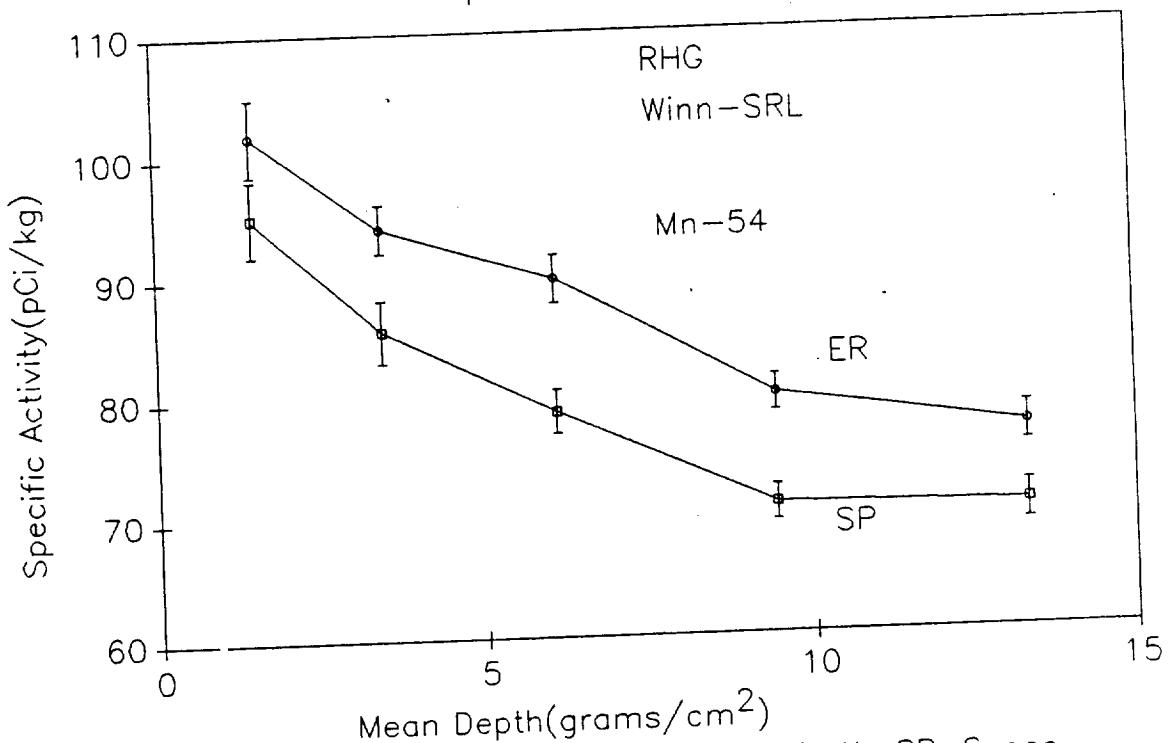


Figure 4. RHG Trunnion Layers: ER-Earth; SP-Space

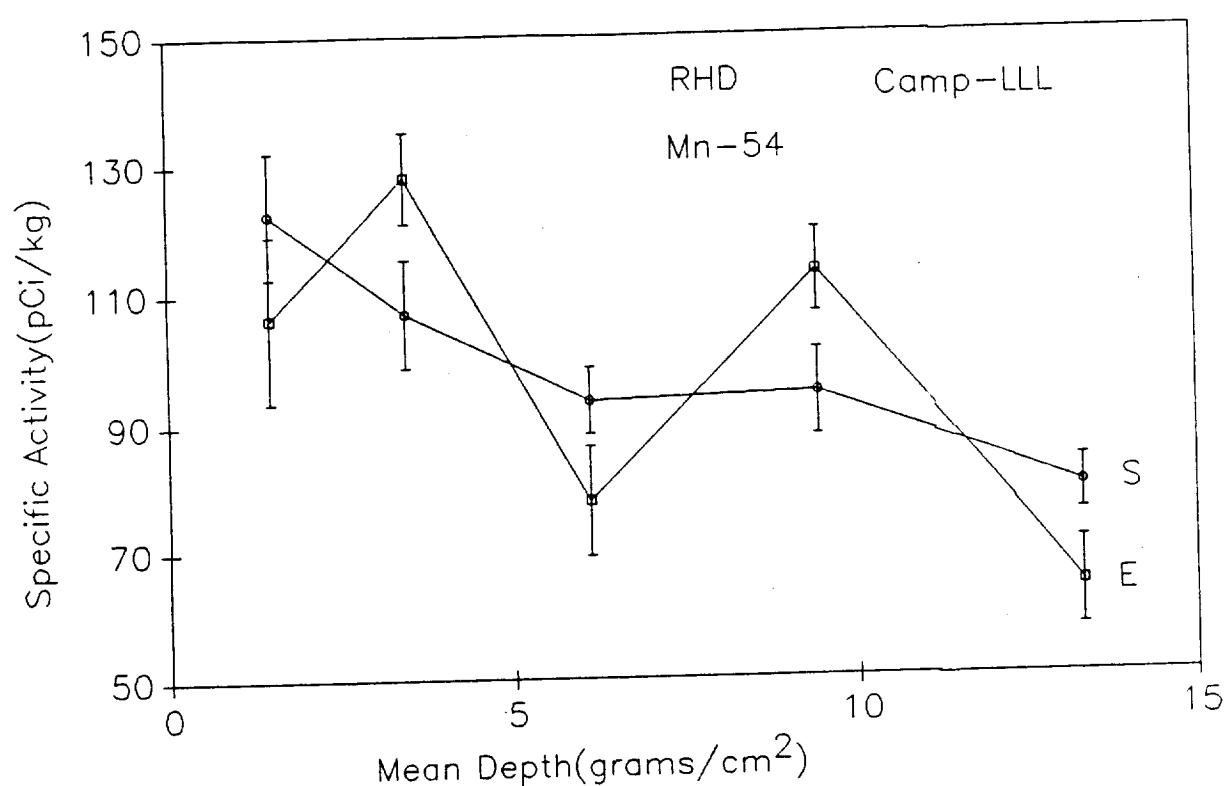


Figure 5. RHD Trunnion Layers: S-Space; E-Earth

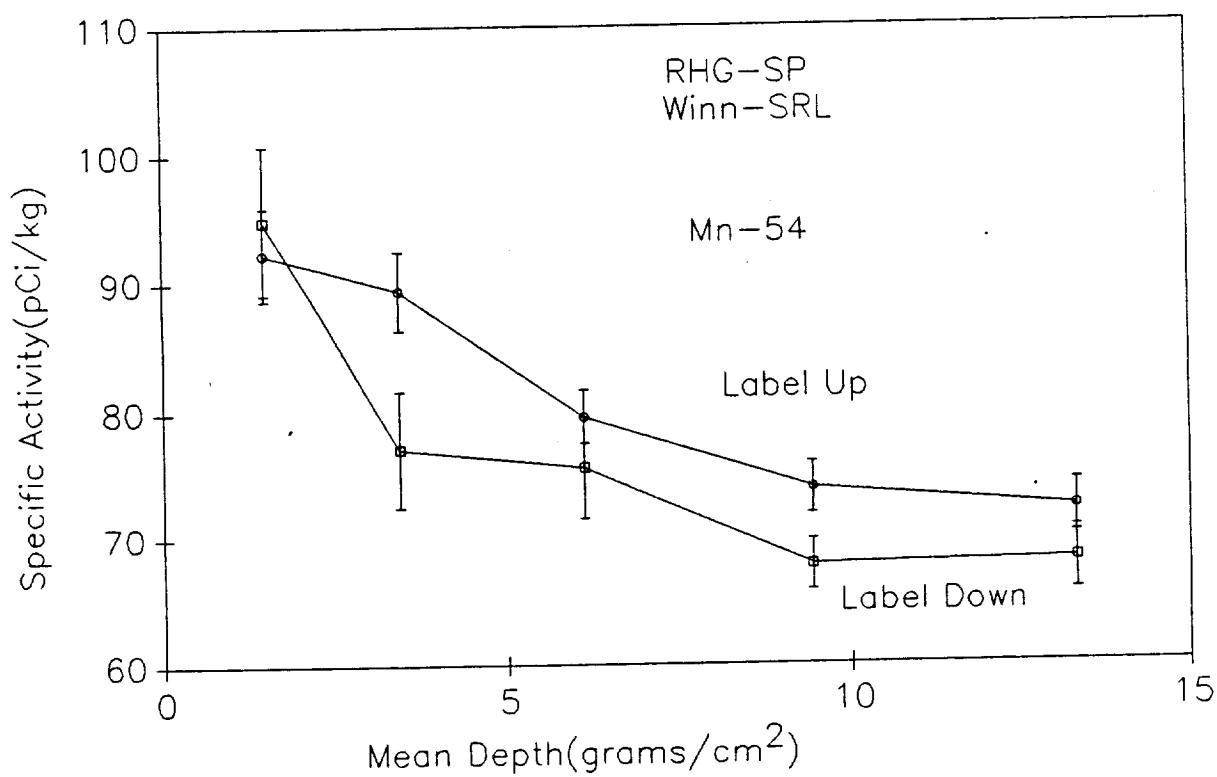


Figure 6. RHG Trunnion Layers-Space End.

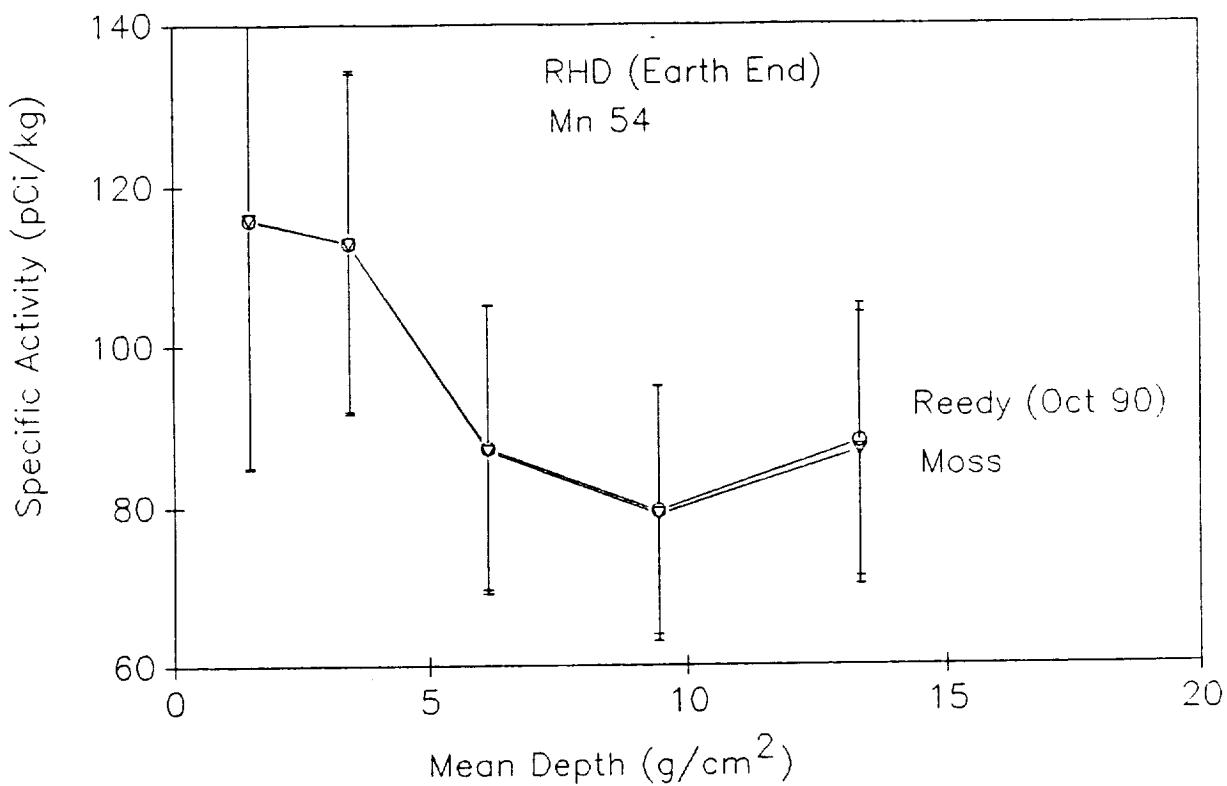


Figure 7. RHD Trunnion Layers (Earth End)

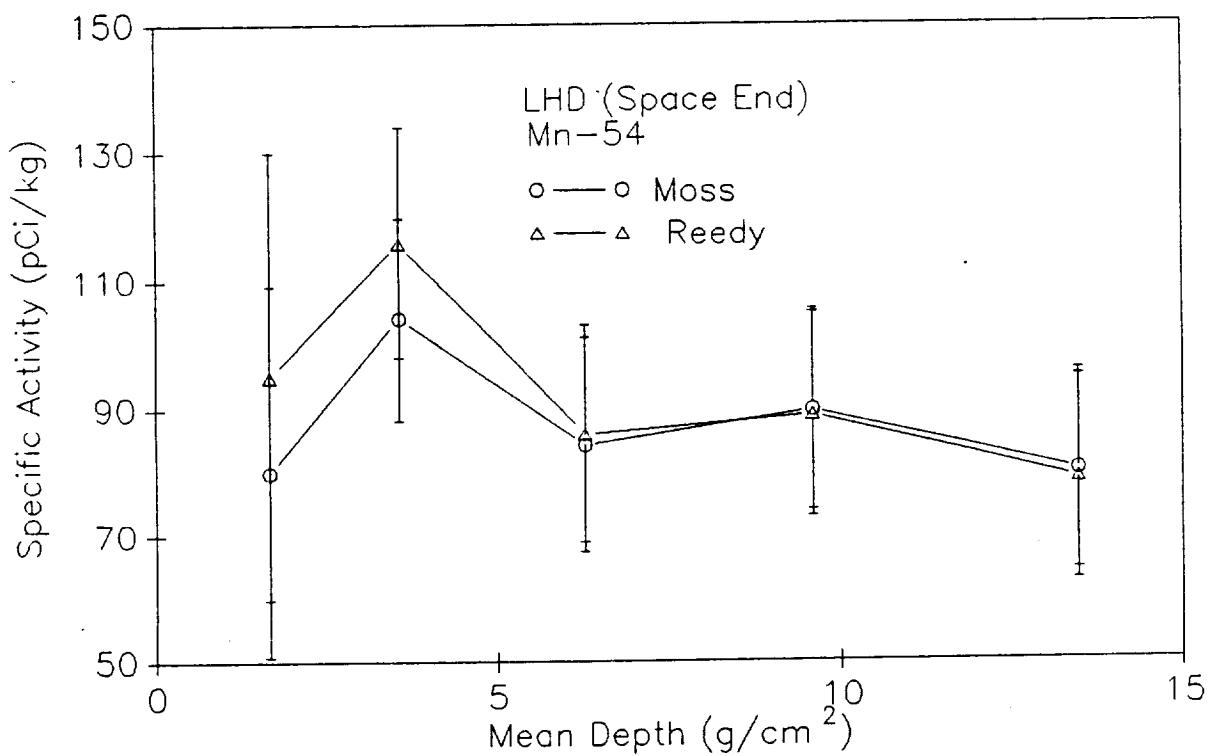


Figure 8. LHD Trunnion Layers (Space End)

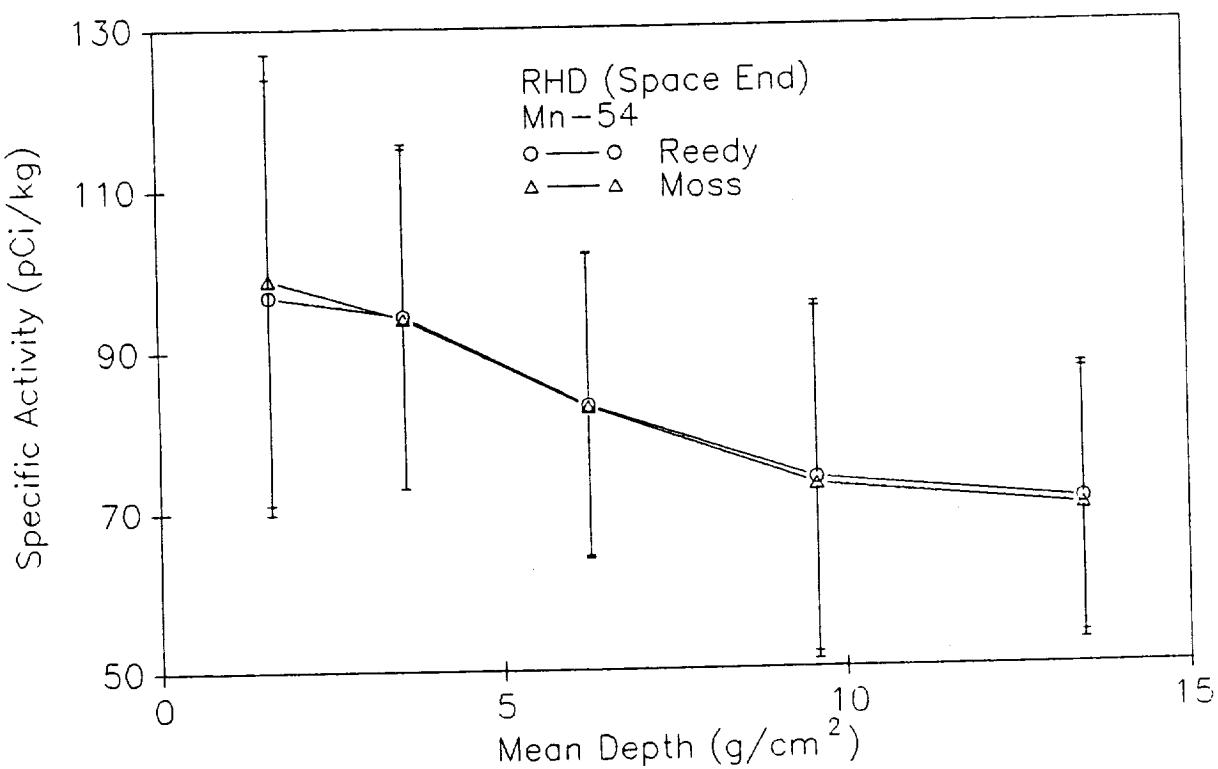


Figure 9. RHD Trunnion Layers (Space End) Counted at LANL

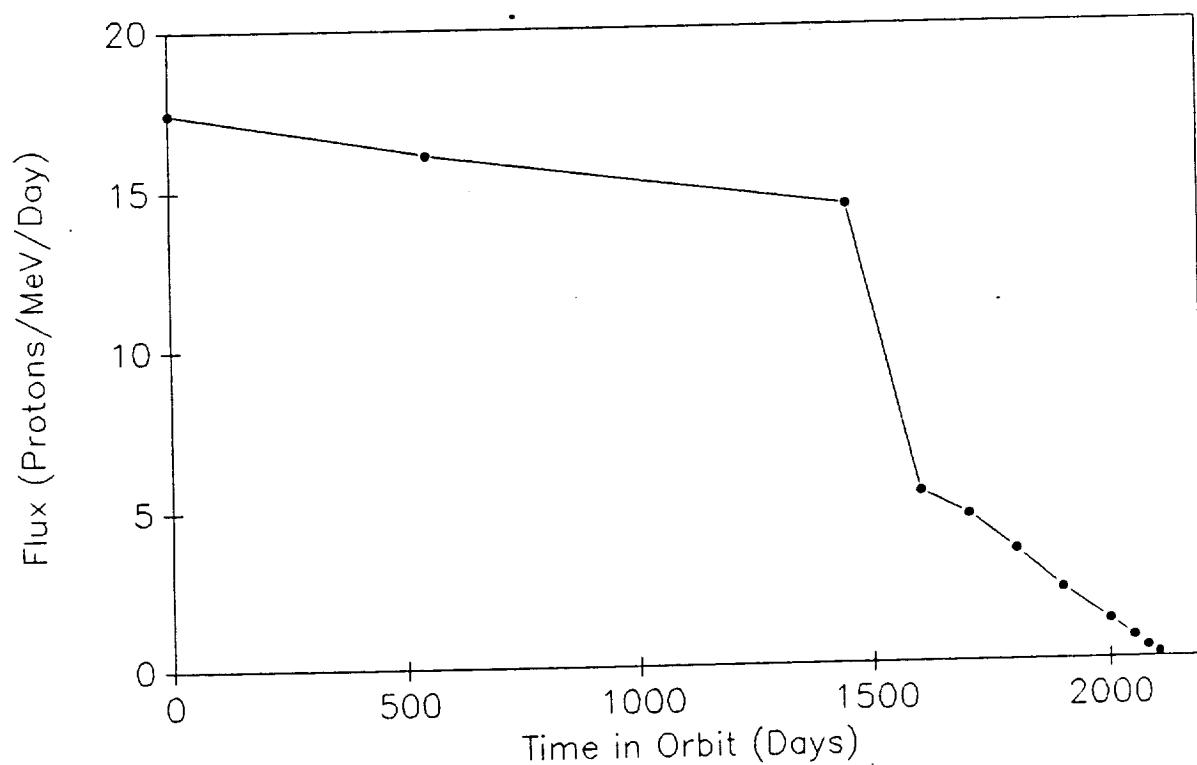


Figure 10. Proton Flux at 50 MeV as a Function of Time in Orbit

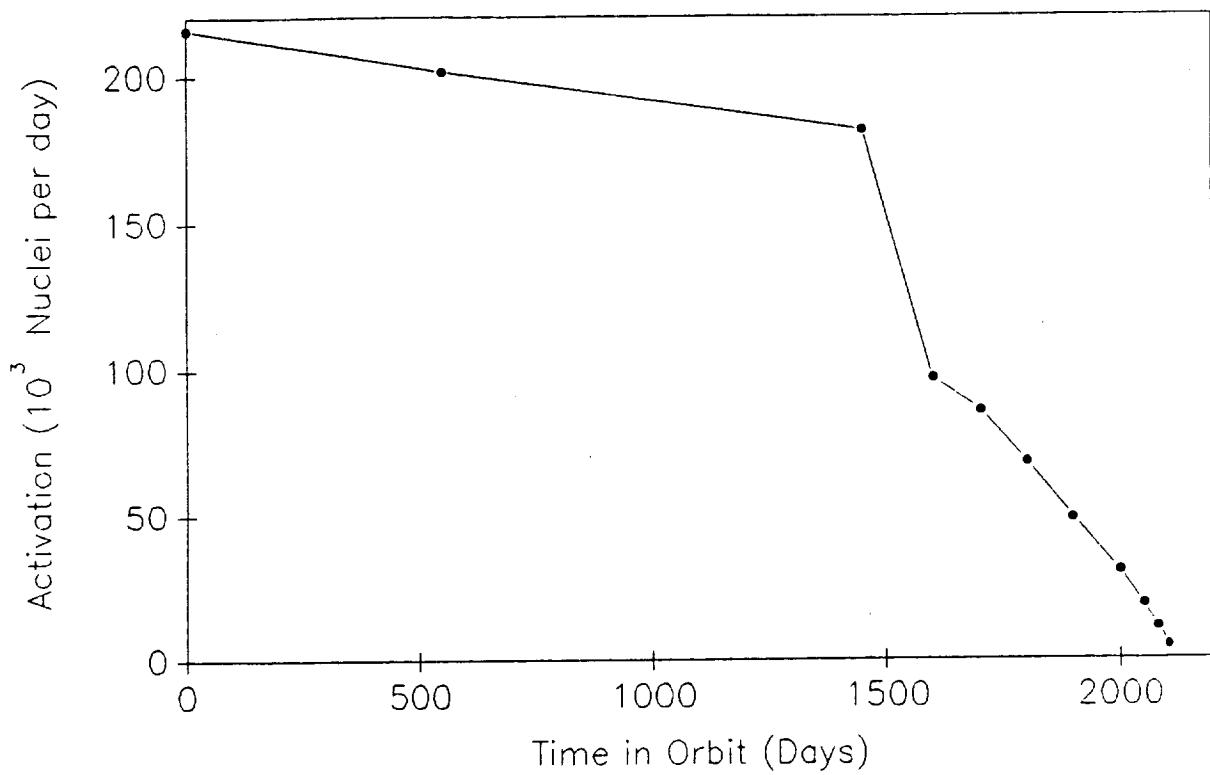


Figure 11. Production of Mn-54 as a Function of Time in Orbit

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